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THE
FAIR EASTERN
REVIEW

FOUNDED BY GEORGE BRONSON REA
35TH YEAR OF PUBLICATION



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CHINA'S INDUSTRIES IN FLIGHT

HAINAN ISLAND

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Vol. XXXV

FEBRUARY, 1939

No. 2

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The Far Eastern Review

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VOL. XXXV

SHANGHAI, FEBRUARY, 1939

No. 2

FAR EASTERN CROSS-CURRENTS

DEFINING the term "Central Government for China" used by Japanese officials, Mr. Arita, Foreign Minister, told the Diet on February 1, that "in common parlance we believe that a new central government in China should be a federal government which would represent China in dealing with the outside world, while various parts of China would be governed by their own administrations."

The unification of all of China under one central government "cannot be easily expected judging by either history or by prevailing conditions." Customs, manners, history and interests differ according to North, Central and South China, he said. Each have their own provincial administrations while their degrees of autonomy also differ in various sections.

While admitting that there will be no limit to technical discussions over the questions, Mr. Arita declared that he wanted to make it clear that by "central government" he did not "mean one with all powers centralized."



If Japan should ever fight Soviet Russia the shrewdest thing that the United States and Britain could do would be to support Japan, as the defeat of the latter would bring about complete disaster to western institutions throughout Asia, Sir Victor Sassoon, well-known British investment banker, told interviewers in New York to-day, says a *Domei* report.

Denouncing China's "scorched earth policy," Sir Victor declared, "I foresee a great famine when the Sino-Japanese conflict terminates, because the scorched earth policy will prevent the raising and distributing of foodstuffs."

The Chinese, not the Japanese, will become the principal sufferers of such a short-sighted policy, he added.

Expressing his opinion, Sir Victor said that America and England, furthermore, should not put an economic embargo on supplies to Japan "to halt the war," as it would just mean the collapse of Japanese economy. Japanese bankers, economists, and diplomats, Sir Victor continued, want the friendship of both nations for the reconstruction of China, but there are circles in Japan which have not realized that yet.

Sir Victor, whose firm has millions of dollars in investments in the Orient, particularly China, arrived in New York aboard the French liner *Normandie*, *en route* to Shanghai. He is chairman of the E. D. Sassoon Banking Co. and a member of the Royal Commission for investigating labor conditions in India.



Clearly indicating that the fight which is looming over the question of the fortification of Guam already has begun, Representative Colgate Darden, Democrat of Virginia, voiced opposition to such a move on the grounds that it would "only serve as a challenge to the Far East."

Flatly opposing the special naval board's report submitted to Congress by Secretary of the Navy Claude Swanson which advocated the fortification of the mid-Pacific island, Representative Darden stressed that Hawaii should serve as a sufficient outpost if the United States is determined to maintain a strictly defensive policy.

Representative Darden added:

"If the United States, on the other hand, is determined to become the guardian of the future of the Philippines, we might as well prepare for war in the Far East."

A serious famine has overtaken the Soviet Union, due in part to last summer's drought and in an almost equal degree to administrative inefficiency and sabotage on collective farms, claims a report from the *Nichi Nichi*'s expert on the Soviet Union, Mr. Katsuji Fuse, now in Berlin.

The famine, which has been guarded with the deepest secrecy (accounting for the restriction of foreign travel and the closure of consulates in the stricken regions) has resulted in a panic of food hoarding and the consequent limitation of sales, says Mr. Fuse.

The areas worst affected by the drought comprise the fertile Ukraine, the North Caucasus, White Russia and the valleys of the Don and Volga rivers.

The famine is said to be the most severe since the Stalin regime came into power, worse even than the one in 1933, when thousands died from hunger and privation.

The Kremlin, which learned of the situation belatedly, according to the report, is doing its utmost to cope with it through the efforts of a newly established drought policy commission and regional food service stations. Food sales are being restricted drastically in an effort to check food hoarding.

Part of the trouble lies in the Government's driving efforts in recent years to boost agricultural production higher and higher. Extreme pressure was brought to bear on the Commissariat for Agriculture, resulting in the execution of the three successive Commissars when they failed to bring production up to the required level. The fate of these men made the post extremely unpopular with potential successors, the correspondent says, and capable officials avoided it as they would the plague. This situation resulted in progressive inefficiency in the Commissariat, which had its effect on general production.

Regional and local agricultural authorities, fearing extension of the purge, falsified their reports to the Central Government, often including in the general harvest the superior grain reserves to be kept for the next sowing season.

This policy of evasion eventually came to light, and the local authorities confessed to the patchwork in their reports. It was then that the Kremlin became concerned and established the drought policy commission.

The Stalin regime is in a most precarious position, according to Mr. Fuse, who observes that the widespread purges have been suspended completely. The internal situation is explosive and the O.G.P.U. has been ordered to be watchful but inactive, at present, lest the hungry masses strike back. The Government meanwhile is striving desperately to keep reports of the actual situation from seeping out into the world.

In a particularly disastrous plight are the great grain exporting regions of the Ukraine, Kuban and the Volga, the *Nichi Nichi* correspondent understands.



Eighteen hours after its departure from Bangkok, the Japan Airways Company Heinkel airliner Nogi landed at Tachikawa aerodrome at 4.52 o'clock a.m., February 5, *Domei* reported from Tokyo.

The four-motored monoplane, sent to the Siamese capital on a goodwill flight, landed at Taihoku, Formosa, at 7.55 o'clock a.m., nine hours after leaving Bangkok. Following an hour's stopover, during which its tanks were refuelled, the machine took off for Tachikawa.

On its outward-bound journey, the plane left Tachikawa at 6.44 o'clock in the morning of January 25 and landed at Bangkok at 5.24 o'clock in the afternoon of the following day, after an overnight stop in Taihoku. Its actual flying time was 18 hours and 36 minutes.

■ ■ ■ ■ ■

The Chinese Government has established a Mining Industry Study Bureau in Chungking for the purpose of developing the various mines in the south-west and north-west. Foreigners are allowed to invest money in the enterprise, but key positions in all mining companies are to be occupied by the Chinese only.

It is reported that in her vast north-west and south-west, China is rich in all kinds of minerals for the development of which the Government is being helped by rich overseas Chinese.

One important aspect of the question is that probably never before has China been so keen about making full use of her natural resources. Informed quarters believe that the fact that the Minister of Economics, Mr. Dong Wen-hou, is a noted geologist, in the confidence of General Chiang Kai-shek indicates the trend of the new enterprise.

■ ■ ■ ■ ■

Japan, in principle, does not intend to indemnify third Power nationals for losses sustained as a result of Japanese military operations, Mr. Hachiro Arita, the Foreign Minister, announced in the Diet on February 1. Replying to an interpellation the Foreign Minister declared that while Japan would respect as far as possible the rights and interests of third Powers in China, she was not prepared to pay indemnities for "war" losses.

This statement of policy, regarding a question of vital interest to neutrals in China, aroused widespread comment. The Japanese government contends that third Power nationals owning property in China should bear, in the same manner as Chinese property owners, losses caused by military operations.

Particularly, losses inflicted upon third-party property in the three circumstances outlined below, are not to be made the subject of claims for indemnity.

- (1) Damage sustained by third Power property used by the Chinese for military purposes;
- (2) Damage sustained as a result of military operations in zones of hostilities and in areas adjoining such zones, and
- (3) Damage sustained as a result of operations dictated by necessity for the successful conduct of military operations in zones of hostilities and adjoining areas.

■ ■ ■ ■ ■

A medal of honor given annually to a French citizen living abroad for the most conspicuous task or action enhancing the prestige of France was awarded, on January 31, to Father Jacquinot de Bessange, S.J., by a literary jury, Havas reported.

In addition to multifarious relief works, Father Jacquinot was responsible for the establishment of a refugee zone, the neutrality of which was strictly observed both by the Japanese and Chinese forces, at Nantao, Shanghai, in 1937, and at Hankow, in 1938.

■ ■ ■ ■ ■

A new protective tariff for China is advocated by the *China Times* in a leading article on February 1, according to a Reuter report from Chungking. The article has attracted much attention, as the *China Times* is generally considered to represent the views of Chinese financial circles.

The journal deplores the fact that "Chungking is rapidly approaching the appearance of a foreign concession, with imported luxuries on display in all shops."

The new protective tariff, it suggests, should aim: (1) At increasing the revenues of the Government, (2) At protecting native industries, (3) At the promotion of social welfare.

"To increase the Government's revenues, to protect native industries in the interior, and also to prevent unnecessary spending on the part of wealthy people on imported luxuries," the paper declares, "it is time for the Government to impose a protective tariff."

■ ■ ■ ■ ■

The continuous export of rice from the interior in Chekiang and Kiangsu to North China, coupled with the recent order from General Chiang Kai-shek requiring all provincial authorities to

store rice for 10 years' use for the army, will be almost sure to cause a serious rice shortage in Shanghai around April of this year, the *North-China Daily News* of February 3 quoted Chinese reports as predicting.

According to the reports, since the Customs and Settlement authorities in Shanghai have discouraged the exportation of rice from this port. Japanese and other merchants from North China who have failed to buy rice in Shanghai have turned their attention to the interior whence they transport rice direct to North China ports. As a result of these big purchases in the interior at low prices, there has been an apparent decrease in the supply on hand in the country. Farmers are not allowed to feed themselves and their families and when they refuse to sell their rice they are punished, it is alleged.

Such being the conditions for merchants who have failed to obtain rice in Shanghai, steamers have been on regular runs between North China ports and rice-producing districts in Chekiang and Kiangsu transporting rice.

The situation is further aggravated by the recent order from General Chiang Kai-shek requiring provincial authorities to store rice in granaries so that the Chinese army will have no worry about food for ten years. Already the order is being carried out by the provincial authorities, although no embargo regulations have yet been announced. All these facts cause fewer rice boats to arrive in Shanghai.

It is reported that the daily arrival of rice in Shanghai during the past few days has shown a decrease in quantity by four-tenths, as compared with the condition in November of last year.

■ ■ ■ ■ ■

Whether or not Shanghai is a port totally under Japanese control is a matter of serious dispute between Chinese authorities and merchants in Chekiang and Kiangsu, as the latter's goods are being forbidden to be transported to this city which is officially considered to be Japanese-controlled area. An embargo has been declared on many native goods destined for Shanghai.

A recent order jointly issued by the Ministries of Economics and Finance forbade 54 main native products to be sent to any Japanese-controlled areas, lest they should be utilized by the enemy for military purposes. The list included wood oil, cotton and paper which are abundantly produced in Chekiang and Kiangsu.

The Ministries are now carefully studying the situation with a view to determining the places which are definitely to be considered under Japanese influence to which no products that can be used for military purposes can be sent. Before an official announcement of these places is made public the various Customs offices have declared an embargo on goods destined for Shanghai.

The question is serious because it affects the livelihood of thousands of merchants in the interior who depend on sending goods to Shanghai. The first such serious problem is the \$10,000,000 worth of cotton awaiting transportation to Shanghai. The cotton is now in Chekiang and the Customs authorities there will not allow it to be shipped to Shanghai.

On behalf of the Chekiang cotton merchants, Mr. Yu Ya-ching, doyen of Ningpo merchants in Shanghai has telegraphically requested the Ministries to allow the cotton to be sent here on the ground that it has been bought and will be used by cotton mills located in the Settlement where the Japanese do not exercise influence. The cotton will not be used for military purposes, Mr. Yu asserted in his telegram. No reply has arrived.

As a relief measure for merchants in the interior the Ministries are reported to be planning to buy the goods which are forbidden to be sent to Shanghai. It is pointed out that the Central Trust Bureau has bought the wood oil in Chekiang, and any tea produced in Chekiang will be purchased by the Foreign Trade Bureau.

How the new order will affect Shanghai in the long run is impossible to forecast at present. It has caused quite a stir among local cotton merchants and mill owners. Informed quarters believe that other merchants may also be affected, and prices of goods mentioned in the embargo list will increase.

■ ■ ■ ■ ■

The talked-about fortification of Guam by the United States may lead to aggravation of its relations with Japan, but anything so serious as war between the two countries is impossible, unless there is an European war, in the opinion of Mr. Kiyoshi (K. K.) Kawakami, well-known Japanese journalist and author who arrived

at Yokohama after four years' absence as Washington correspondent of the *Nichi Nichi*.

The armaments policy of President Roosevelt is designed partly to distract public attention from domestic problems, he said. To all appearances and purposes, it aims at the recovery of the New Deal's lost popularity by providing more work for the unemployed, who have been increasing despite efforts to bring about their absorption by industry. His policy is also directed toward the unstable European situation.

Because of the prevailing uncertainty in Europe, Mr. Kawakami explained, Americans feel uneasy, particularly with regard to Germany. Germany is very unpopular among Americans because of its pressure on American Catholics, who have considerable influence on American public opinion.

Mr. Kawakami visited various countries in Europe during the last three years. From his observation, he has come to a definite conclusion that war will not break out in Europe for two years.

Chancellor Adolf Hitler has been playing a very risky game, he said, but he has taken what he wanted without war. He knows the limits of his policy. At the time of the European crisis over the Sudeten issue, he actually did not want war any more than Great Britain did. But the latter yielded to him because of its inferiority in the air.

Now America is inclined to give assistance to Britain and France, apparently to hold Germany in check. If war should break out in Europe, the United States may join it in six months. In that event, war between Japan and the United States may be possible, because Japan is tied up with Germany and Italy by the anti-Comintern pact, said Mr. Kawakami. However, he continued, it is quite inconceivable that the United States and Japan will come to blows over the current China incident. Relations between the two countries are not so bad as to drive them into hostilities.

As regards the fortification of Guam, Mr. Kawakami stated that if the island is fortified, it will constitute a menace to Japan, with the result that relations between the two countries may turn somewhat for the worse.

When asked for his views as to the best means of improving American-Japanese relations in the China incident, Mr. Kawakami thought that Japan should give America what it wants in China as far as possible.

With respect to the recent American Government steps to restrict sales of airplane parts to Japan, Mr. Kawakami explained that the Government has adopted the measure on the grounds that sales of such arms as may be used by Japan for bombing civilians is undesirable from the humanitarian viewpoint.

Questioned about the projected revision of the American Neutrality Act, Mr. Kawakami remarked that President Roosevelt is strongly inclined to revise it, but Congress is not. If it is changed according to President Roosevelt's desires, it may work to the disadvantage of Japan.

The question of revising the Neutrality Act, he explained, was brought up by Mr. Roosevelt when the New Deal was more popular than at present, but even then the changes were not carried out because of strong opposition. In the light of this, it may be difficult for President Roosevelt to revise it now.

Concerning American armament expansion in general, Mr. Kawakami saw no need of such huge armaments by the United States if they are to be used for defense of the country alone.

President Roosevelt's message to Congress on armament expansion was very, very vague, he said. It stressed the defense of the whole of America, but no country dares to attack the American continent. Viewed from this point, it may be said that the policy of President Roosevelt is intended to distract public attention from domestic problems and in preparation for untoward events in Europe.

■ ■ ■ ■ ■

A special teachers' college of the Reformed Government was opened in Nanking on January 29, with Japanese and Chinese officials attending the ceremonies.

The college has a six-months ordinary course for middle school graduates, and a two-months short course for those who have been trained as school teachers under the Kuomintang Government. The enrolment on its opening day consisted of 174 male students and 61 women students.

The college will endeavor to heighten the scholarship standard which will have important bearing upon primary education of the future.

Financial and trading circles in Tokyo are in favor of excluding the Shanghai market from the "yen bloc" in connection with exchange, it was reported by Domei on February 6. Financial circles maintained that this was a necessary fundamental measure to bring about a revival of trade in Shanghai.

The Japanese Government has curbed exports to Central China through Shanghai, excepting special goods for military use, in view of the fact that such exports did not result in the acquisition of foreign currencies by Japanese, as prices of goods exported to Central China were paid in Bank of Japan notes, which have been widely circulated since the spread of hostilities.

Financial circles express the opinion that restrictions should be removed from exports to Shanghai of goods which are paid for in foreign currency.

■ ■ ■ ■ ■

Senator Robert Reynolds, Democrat from North Carolina, on January 25 asserted that the United States has launched an "undeclared war" against Japan by helping Chinese interests through the \$25-million loan by the Import-Export Bank.

He added that the loan was a result of an agreement between the United States and Britain consummated during Anthony Eden's recent visit to Washington.

"The United States is pulling British chestnuts out of the fire in the Far East, although our interests over there are only one-tenth of Britain's," declared the senator.

He also criticized the Administration's definite program, in co-operation with England, against Japanese activities in China, as well as the American attitude toward totalitarian states.

Senator Reynolds declared that Japan has as much title to Chinese cities as Britain has to Hongkong, adding that he sympathized with the Chinese people, but not with the Kuomintang Government, which he alleged to be "two-thirds Communistic."

Asserting that Britain is always ready to give away other people's possessions, he said that England gave the cause for world peace and democracy only "lip service."

Continuing his attack against Britain, the senator from North Carolina said that the aid needed by America for her naval bases in the North Atlantic and West Indies should be given by France and England as partial war debt payments.

He added that France should cede Martinique and St. Pierre Miquelon islands in the North Atlantic to America.

Concluding his speech on the Senate floor, Senator Reynolds declared that the United States should take stock of her local unemployment situation without attempting to serve as the world's policeman.

■ ■ ■ ■ ■

Direct radio telephone communication linking Japan with Shanghai and Nanking, and Shanghai with Hankow and Dairen, will be started early in April when the Central China Telecommunication Company will open a 10-kilowatt radio station at Chenju in the Shanghai outskirts.

Reconstruction work on the Chenju radio station is progressing and is expected to be completed within the next month. Opening of the station will mark another step in the development of the Japanese Central China radio communication service, the daily remarked.

At present all radio telephone communications to different parts of Japan from Shanghai originate from the company's station on Linching Road and are transmitted to Tokyo, where they are relayed to their final destination.

The Linching Road station is only equipped with a two-kilowatt transmitter and the company has been overtaxed with requests for service.

■ ■ ■ ■ ■

The Sino-British Boxer Indemnity Fund Committee has decided to organize a corps for studying and developing the natural resources in China's border provinces, the *North-China Daily News* reported on February 8. Students interested in the subject have been grouped into three parties and will be sent out to investigate in three different parts of the country.

The first party will study the natural resources in Szechuen and Sikong, the second party, those in the north-west and the third party, those in the south-west including Kweichow, Yunnan and Kwangsi. The investigation period is one year. Three months have been set aside for making necessary preparations and another

three months for winding up work. The actual research and investigation work, therefore, will cover six months only.

They will study geology, physics, economics, sociology, and agriculture and all other co-related subjects in their respective regions. For each party \$50,000 has been set aside. Many college students have registered their names in order to participate in this interesting investigation. The first party is expected to start its work soon.

Besides subsidizing those students engaged in this investigation work the committee will also grant scholarships to 125 college students doing research work in laboratories. Of this number 80 will be chosen from among the college graduates. More than 200 students studying natural sciences are already being subsidized by the committee.



In a swift combined naval and military attack, Japanese forces succeeded in securing control of the two major towns of Hainan Island and occupying its sole fortress on February 10. Hainan occupies an important position in the Far Eastern political map, strategically dominating the coast of French Indo-China, between British Hongkong and Singapore, and flanking the Philippines, 500 miles to the east.

Explanations, similar in shade and tone, were made by Mr. Hachiro Arita, Japanese Foreign Minister, to the Ambassadors at Tokyo of France, Great Britain and the United States to the effect that the occupation, being directed solely by military necessity, would be temporary and have nothing to do with the question of Pacific strategy.

The Japanese authorities will maintain peace and order on the Island, and will protect lives and properties of Third Power nationals, the Japanese Vice-Consul dispatched from Canton informed the French officials.



A proposal that the Chinese Government must attempt at once to close the breaches in the Yellow River dykes at Huayuankou and Chaokou, and at the same time divert the flood waters into the sea at Linghungkou, via Haichow, is contained in a special article by Mr. Tsao Shu-min, a celebrated Yellow River expert, published in the *China Times* at Chungking on February 10.

The writer declares himself in support of an appeal addressed to the Central Government by Mr. Han Kuo-chun, veteran Kiangsu leader, that "the Government must devise means to meet the Yellow River flood problem and save 10,000,000 people in north Kiangsu province."

Following the entrance of the Yellow River flood waters into Hwai River, Mr. Tsao Shu-min writes, nine cities in north Kiangsu province were facing the danger of being completely submerged under the flood waters.

Mr. Tsao suggests the flood waters should be diverted northward from the Hungtseh Lake into the Lutang River, and then follow the Shu River into the sea via Haichow and Linghungkou.

"Apart from the Yellow River problem," he declares, "it is vital for the Government to save the nine cities in north Kiangsu province for military reasons, since this district can be used as a Chinese base for future counter-attack in the direction of the Nanking-Shanghai area."



Leading Chinese business men will be invited by Mr. Fu Siao-en, Mayor of the Greater Shanghai, to join the Chinese Chamber of Commerce which will resume work soon, according to the *North-China Daily News* of February 1.

With the adoption by the Legislative Council of the Reformed Government of new Chamber of Commerce regulations, the Ministry of Industry decided to revive the Shanghai Chamber of Commerce which has not been functioning since the withdrawal of Chinese forces from the local area, the paper added.



In a two-column interpretation of Japan's motive in China, the Tokyo correspondent of *The Times* says a bigger task has never been deliberately undertaken by any nation.

It is an attempt to telescope into a few years work larger than Britain accomplished in India in a century and a half, by a mixture of military and commercial penetration.

After discussing Japan's will to succeed, the writer says that paradoxical though it sounds for the moment, the statement of Mr. Marmoru Shigemitsu, Japanese Ambassador in London, that Japan seeks China's friendship, is true.

The Chinese would gain by a settlement which would stabilize the Far East, *The Times* correspondent says.

In the last decade, they have lost Manchoukuo to Japan, and Outer Mongolia to Russia. A comprehensive peace with Japan, he says, can arrest the process.



M. Maxim Litvinoff, the Soviet Foreign Commissar, informed the Hungarian Minister in Moscow that the Soviet Government has decided to sever diplomatic relations with Hungary. The Hungarian Minister was told that the reason for this step was "German pressure on Hungarian affairs, and Hungary's adherence to the anti-Comintern Pact."

M. Litvinoff informed the Hungarian Minister that the Soviet Legation at Budapest would be closed, and that the Soviet Government expected the closure of the Hungarian Mission to Moscow.

The official Soviet agency pointed out that the decision of the Hungarian Government to join the anti-Comintern Pact could not be justified by the interests of the Hungarian State itself, "which by no means coincide with the aggressive aims pursued under the guise of this Pact by its participants, and in the first place by Japan."

Observers believe that the decision of the Soviet Government is intended as an oblique blow to Japan by particularly mentioning it as an aggressor, and as a warning to Poland which is frequently reported to be contemplating adhesion to the Pact.



Mr. Frank Poletti, Postal Commissioner in the Peiping area and an Italian subject, who was kidnapped together with a Russian lady and three Chinese servants near the Ming Tombs on January 10, has been released by his captors. He reached Peiping safe and well nearly 40 days after his capture.

For reasons, not yet clear, the captors have returned \$10,000 ransom, paid within a week of his capture.

His captors, it is understood, were uniformed guerrillas and not bandits. They are said to have communicated with the Chinese National Government at Chungking, which instructed them to release Mr. Poletti.

The kidnapping occurred 25 miles from Peiping, in the neighborhood of the Mausoleum of the Ming Dynasty. The area was not 100 per cent safe even before the outbreak of hostilities.



Possibility of a dispute between the United States and the Soviet Union regarding sovereignty over Wrangel Island, in the Arctic Ocean, was foreseen in Washington on February 17, when Mr. Marvin Maas, Republican Representative of Minnesota and member of the House Naval Affairs Committee, proposed the establishment of a United States Navy air base on the island.

Although the island, north-west of Alaska, is now occupied by Soviet Russia, Mr. Maas said the occupation was without legal right and that the United States "has a clear title to the island."

Mr. Maas, who introduced his proposal in the House of Representatives in the form of a formal bill, said a similar bill would be introduced in the Senate by Senator Robert Reynolds, Democrat of North Carolina.

"We expect the island to become an important point in relation to our new system of defense in the Far East," Mr. Maas said. "Establishment of an American naval base on Wrangel Island would round out our program of establishing such bases in Alaska. These bases are solely of a defensive nature, of course."



The Japanese Consul-General at Shanghai, Mr. Y. Miura, sent a note to the Senior Consul dated February 1, urging the foreigners still remaining at Kuling, a famous health resort near Kiukiang, to evacuate by February 10, in accordance with certain regulations, because the Japanese forces are about to conduct mopping up operation against the guerrillas in the neighborhood.

Following the Japanese note, requests have been lodged with the Japanese Consulate-General by the American, German and Norwegian Consular authorities for assistance in communicating

with their nationals at present at Kuling, it was revealed at the Japanese Press Conference. The Norwegian request was made verbally, it was added.

Questioned as to the methods used by the Japanese forces at Kiukiang to establish communication with Third Party nationals in Kuling, an Embassy spokesman replied that couriers were used. Third Party Powers, he pointed out, had revealed that their methods of communication with Kuling were not complete and therefore these requests for Japanese assistance had been made.

There may have been passages in the American note to the Japanese authorities about responsibility for the safety of American nationals at Kuling, the spokesman added in answer to a question by an American correspondent. As far as he knew, however, fighting had not commenced in that area and at the present time preparations only were being made to attack the Chinese forces at Kuling.

Asked what would be the position if regular communications were not established with the foreign community at Kuling before February 10, the spokesman replied that the note expired on Friday, and he expected that its terms would be carried out. The spokesman added that he believed that regular communications were being established but it was impossible for them to verify this as they were not at Kiukiang.

A reply to the Japanese request for evacuation had been received from foreigners in Kuling, he continued, this reply containing the information that they were considering the Japanese note.

On February 9, a Japanese Embassy spokesman announced that the Japanese military authorities had expressed their willingness to consider the postponement of the time limit for the evacuation of Third Power nationals from Kuling.

The spokesman emphasized, however, that the Japanese military authorities were not making any commitment regarding their military operations. This, he added, must be clearly understood.

In the meantime, the Japanese military and Consular authorities at Kiukiang held a conference on February 11, with Mr. B. MacDermott, British Vice-Consul at Hankow, and Mr. J. Davies, American Vice-Consul, also from Hankow. The two consular officials arrived at Kiukiang on Friday in the U.S.S. *Oahu*. The British gunboat in port is H.M.S. *Ladybird*. A decision was reached that British and American sailors be dispatched to the mountain resort of Kuling to escort down the third Power nationals.

According to later arrangements, however, five persons consisting of the Captain of H.M.S. *Ladybird*, an officer from the U.S.S. *Oahu*, the British and American Vice-Consuls at Hankow and a representative of the Asiatic Petroleum Company, were to go to Kuling and escort the evacuees on February 19, instead of foreign sailors. A Japanese escort was to be provided as soon as the Japanese lines are reached.



A boatload of Japanese civil engineers sailed for China on February 20, to engage in building a "greater Shanghai along the left bank of the Whangpoo River adjoining the International Settlement," according to Japanese reports.

The engineers, who assembled at Nagasaki on February 20, have been employed by the Shanghai Real Estate Co., a Sino-Japanese joint concern.

"Town planning has been completed already as a result of several actual surveys of Shanghai and vicinity by Japanese experts," the reports said. "The new and greater Shanghai will be divided into commercial, residential and industrial zones, interspersed with parks."

"When harbor construction is completed, it is expected that the largest ships will be able to pull up alongside the piers. Work on the project will begin with the former municipality site as the center."



According to a United Press report from San Francisco of February 2, arms shipments from the United States to the Far East, including both Japan and China are falling off at a very heavy rate. This is attributed to general causes. In the case of China, the shipments have declined because the Japanese have cut off practically all major lines of communication. In the case of Japan, however, the decline is attributed to two major reasons.

Pressure brought to bear on the State Department against the further shipment of aeroplanes to Japan, while at the same time the demand for American aircraft by other foreign countries

so far exceeds production possibilities of American manufacturers that the latter can afford to be "Choosey" in their markets, and thus drop the Japanese field, while the Japanese have difficulty in getting sufficient foreign exchange for purchases in the country.

It is pointed out that if the recent trend downward of arms shipments to the two countries continues, the question of which is the most favored nation will be a purely academic one.



A radio telephone service has been inaugurated between Urumchi and Chungking, Reuter reported from Chungking on January 31. The test made on the previous day was said to have been entirely successful and a direct Sinkiang-Szechuen radio telephone service is expected to be opened to the public shortly.

According to Mr. Tang Chung-lien, an expert formerly attached to the Chinese Government Radio Administration in Shanghai, who is now working in Kunming, an automatic telephone system is being installed in the Yunnan capital. At present, the city has 700 telephones operated on the old system, but as many modern people have flocked to the city since the hostilities it has deemed necessary to have automatic telephones.

All necessary materials for the installation have been ordered from Siemens China Company, whose engineers are already in the city doing supervision work. The present aerial lead wires will be changed into underground cables, the completion of which work is expected at the end of October of this year. Indoor exchange switchboards will then be erected. The number of new telephones will be 1,000, permitting a further increase of another 1,000, which are considered sufficient to meet the city's demand.

The Long Distance Telephone Network Administration has already linked Kunming with Chungking. Other cities are being linked by the Administration, with Kweichow and Kwangsi being first taken into consideration. After the completion of the installation of an international radiophone in Kunming, any Chinese in the interior can speak to the outside world by linking the long distance telephone with the radiophone.

It will be recalled in this connection that the Chinese Government Radio Administration in Shanghai was taken over by the Japanese more than a year ago, but as early as 1932, the Chinese Government built a radio station in Chengtu, and to deal with emergency cases an auxiliary station was later established in Kunming, now known as the Kunming International Radio Office which handles both radiograms and radiophones. Shanghai experts have gone there and machines have been sent there continuously.

The Kunming International Radio Office, which may be considered a substitute for the former Shanghai Radio Administration, will soon be officially opened after being amalgamated with the provincial radio station, for which negotiations are being conducted. Their further direct circuits will be Hongkong, Hanoi, Singapore, Rangoon, Manila and European cities. The American circuits will be maintained by the Chengtu Station. Chinese in the interior can then dispatch messages to other countries without censorship by outsiders.



The reason for the closing of the Chungking branch of General Chiang Kai-shek's headquarters was explained on February 1 by General Chang Chun, who said that the need for the headquarters ceased with the removal to Chungking of the offices of the National Military Council, Reuter reported from Chungking.

General Chang Chun added that "residences" had been established for the Generalissimo at Chengtu and Ningyuan (Sichang), in the south-western province.

General Ho Kuo-kwan would be in charge of the Chengtu "residence," he announced, the report added.



A Havas report from London stated that it was announced there on February 3, that several British firms would sign contracts with the Chinese Government for the delivery of 300 lorries of from three to seven tons each, to be used on the new Yunnan-Burma highway.

The order for the vehicles will be included in the credit of £1,500,000 extended to China by the British Government last December.

Preliminary parleys are in progress for extending more important credits to China, which will be used for the purchase of railway and telegraphic material, the report concluded.

China's Industries in Flight

CHINA's industrial predicament brought about through loss of a vast extent of territory has caused the Kuomintang Government to encourage the removal of Chinese factories from coastal and riverine cities into south-west China—Kwangtung, Kwangsi, Hunan, Kweichow, Szechuen and Yunnan provinces. It is reported that the government has appropriated thus far, \$20,000,000 for the south-western Economic Reconstruction Commission to effect development of these provinces.

The necessity to develop the interior and to bring about a financial revival in China so as to enable the Kuomintang Government to continue its long-resistance policy against Japan, has been felt all the more keenly since the Wuhan area and Canton were occupied by Japanese forces.

It follows logically that the industrial development of the interior provinces may be the last hope of the Kuomintang Government for survival. The question is whether this government can successfully shift the industries in the coastal and river cities to the south-western provinces. An explanation may be given why the Chinese government has undertaken the vast task of transplanting industries to the interior provinces instead of developing existing industries in these distant regions.

Industries in China have hitherto had a one-sided growth along the coast and the Yangtze owing to various factors such as easily available power, transportation facilities that made it simple to acquire raw materials and fuel, easy access to markets for products and abundant supply of labor in these more populous regions, nearness of modern monetary organs able to advance loans, political unrest in the interior which made industrialists shun activities there to seek shelter in the coastal and riverine cities that have foreign concessions.

The factors enumerated above amply explain why China's industry has been developed in the cities along the coast or on the rivers. Since almost all of these industrial regions have come under Japanese occupation, the blow dealt to China's economic and financial equilibrium can well be imagined. To escape this plight the Chinese have, of necessity, chosen the interior for future industrial efforts. It will be a huge task to open and develop the south-west provinces as a new center of industry. Only primitive plants are available in these regions at present. The Chinese leaders have, therefore, planned to transplant factories into the south-west and also to develop existing industries in the interior. Thus, from Shanghai, at least 153 factories have been moved away. According to the Industrial and Mining Readjustment Commission of the Chinese Ministry of Economics, the Commission financed the various manufacturers to the sum of \$10,000,000 and a like amount has been granted by the Kuomintang government to certain industries.

It is further reported that under the auspices of Mr. Huang Shih-feng and other over-seas industrialists, a West-China Land Reclamation Corporation is being organized with a capital of £500,000. A Great China Industrial Corporation has also been organized with a capital of \$10,000,000 by General Liu Wen-hui, Chairman of the Sikang Provincial Government, for exploitation of the natural resources in Yunnan, Szechuen and Sikang.

The task of financing the industries has been entrusted to the Central Bank of China, the Bank of China, the Bank of Communications, and the Farmers' Bank of China in Szechuen, Sikang, and the north-western provinces.

Thus it will be seen that the Chinese National Government seems to attach the highest importance to the development of industries in the interior, both by transplanting factories into the interior, and by developing resources of the regions. A high official of the Readjustment Commission is quoted as saying that like the moving of cultural elements from the sea coast into the heart of China, the shifting of the nation's industrial resources from the Shanghai-Wusih sector into the interior may be expected to bring telling effects in moulding a future China. It may be no exaggeration to say that the life or death of the Kuomintang Government depends upon the successful execution of industrial development of the south-western provinces.

As set forth above, the establishment of a new economic center in the south-western provinces is to be carried out by two methods:

(1) transplanting of factories from the coastal and riverine cities to the interior, (2) development of the resources in the interior.

A first condition for successful execution of the big undertaking will be the need of facilities of transportation. In the six south-western provinces the Canton-Hankow railway is the main arterial line. Moreover, the Canton-Hankow railway, the most important arterial line, no longer serves the Kuomintang government, for both terminals of the railway and portions of the line are occupied by Japanese forces. It is reported that the building of new lines is being planned by the South-Western Economic Re-construction Commission and some lines are already under construction.

Experts agree that at least eleven lines are necessary for inter-linking the six provinces, namely, two lines between Shensi and Szechuen, three lines between Hunan, Kweichow, Yunnan and Burma, two lines between Yunnan, Canton and Burma, four lines between Szechuen, Kweichow, Kwansi and Kwangtung. When these eleven lines are built and form a vast transportation net, they will afford, so it is said, a bulwark for anti-Japanese campaigns. It is, however, thought financially impossible for the Kuomintang Government to achieve the construction of these lines, for the enormous sum of about 700,000,000 yuan must be found for the purpose, and a time factor must also be taken into consideration. It will take at least a decade for the completion of the lines.

Then it may be said that railway lines can hardly be relied upon for the removal of industry or development of resources. The only alternative transportation means is highways, the mileage of which is put at 27,000 *ri*, but the most of these highways traverse wilderness, and are not paved. They are washed out in places by heavy rain from time to time, making it extremely difficult for trucks and motor lorries to use them for transportation of heavy traffic, such as machinery, etc. The number of available trucks is also limited. At present about six thousand trucks are on hand and even if newly purchased units are added, there will be only ten thousand trucks at the most. A majority of these trucks are frequently requisitioned by the army, so that the number which can be utilized for general traffic is insignificant.

With such poor traffic utilities it may be very difficult to establish industries in these provinces remote from tide water. Therefore the completion of transportation facilities is the *sine qua non* of the economic development of the interior regions. Next to transportation difficulties, the scarcity and high prices of building materials are also obstacles which lie in the way of economic development of the interior. The Kuomintang Government imports timber, ironplate and other metallic materials from abroad, but since the hostilities the import of these materials has been much curtailed on account of government control of exchange and trade.

In 1936 timber worth 34,000,000 yuan in value was imported, but in 1937 it was reduced to 23,000,000 yuan. As to the import of metallic materials the amount remains the same, but the greater portion of these imports were used for war purposes. Thus the shortage of material in stock and difficulty of transporting or importing materials have caused prices to soar. For example, while the average price of architectural materials in Shanghai in April, 1938, advanced only by 18 per cent as compared with figures of the pre-war period, prices of the same materials in Chungking advanced 51 per cent. The average price of metallic materials in Shanghai in April, 1938, increased only 4 per cent, but the price of the same materials in Chungking increased by 25 per cent, and the price of iron and lead went up 300 per cent.

The third factor which is a major obstacle to the development of the interior is the lack of capital. The Government has allowed various provincial authorities to issue construction bonds, while banks have advanced loans for construction purposes.

So far the bonds issued by local government amount to 20,000,000 yuan in Kiangsi, 19,000,000 yuan in Hunan, 5,000,000 yuan in Hupeh, and 10,000,000 yuan in Chekiang. Honan, Fukien and Kansu provincial governments are also authorized to issue reconstruction bonds. The Kuomintang government provided 390,000,000 yuan in 1938 for construction purposes. At present there are 322 banks in the six provinces. This indicates how the National government is striving to build up the economic strength of the interior regions for long resistance against Japan.

So long as a huge sum of foreign capital is not forthcoming it seems almost hopeless to attempt to realize such a grandiose program of planned economy. Present Chinese financial resources are scarcely adequate for such an economic plan, however great financial subsidies the Government may plan to give to industrialists and financiers. If hopes of foreign financial aid are not realized, the question of capital will prove a great obstacle to the successful execution of the plan.

A fourth factor which contributes to the difficulties of shifting the nation's economic center to the interior is the unrest in these regions. These provinces are too highly localized to conduct to the consolidation in them of the national economy, and the fact that the inhabitants are imbued with anti-foreign sentiments is also a matter which cannot be lightly disregarded.

Considering these factors, the removal of industry and the development of resources in the south-west provinces will never be achieved easily. It is, however, not wise wholly to ignore progress being made in shifting industries or developments achieved in the new field by which General Chiang Kai-shek aims not only to lay the foundation of economic reconstruction, but to create a future New China to effectively resist Japanese forces.

Although foreign loans on a huge scale cannot be expected at present, at least Great Britain will not grudge some financial help in developing transportation and communication facilities in order to improve her trade with China in these interior regions, if only to compensate what she has lost in trade in the Wuhan and Canton areas.

Although such action on the part of Great Britain may have been prompted only by economic considerations, yet it will result in strengthening to a certain extent the Kuomintang Government

in its resistance against Japan. In December last, Britain and the U.S. reached an agreement in principle for the grant of a £10,000,000 loan to the Chinese Government for the construction of a 500 kilometer railway between Hsiangkwei and the Burmese border. This railway project, it is said, is being financed exclusively by British interests with the assistance of the Export Credits Department. A total of £6,000,000 will be devoted to the actual construction of the railway, while the balance of £4,000,000 will go to the Chinese Government for purchase of extra railway materials and motor lorries. This fact is enough to show that British and American financial assistance to the Kuomintang Government is extended to increase their trade gains through the economic development of the south-western provinces. Such financial assistance can only prolong Sino-Japanese hostilities. The Anglo-Saxon Powers might just as well directly supply China with arms.

Perhaps they should adopt the wiser policy of endeavoring to restore peace instead of obstructing it, for they can get far greater commercial gains through the earlier restoration of peace. It is not to be expected that Britain or the U.S. will singly or together advance such vast sums as are required to permit the National Government to achieve its object of developing the south-western provinces. An insignificant amount of capital may not prove a great factor in deciding the ultimate fate of the Kuomintang government, but any financial assistance, whatever form it may take, is sure to pin-prick Japan with the result that incalculable harm may be wrought upon rights and interests in China of these third power nationals. In fact, Great Britain is making a 50 to one bet in advancing a small loan to the Kuomintang Government for the development of the south-western provinces, and the result probably will be what results usually are in cases of wagers at such odds.

Hainan Island

HAINAN Island, which is temporarily under occupation of the Japanese forces, is a little bigger than the Island of Formosa, and occupies the same strategically important position as Formosa.

Mt. Wushih and the surrounding ranges form the highlands and all rivers in the Island originate from the mountain which has a height of 5,870 *shaku* (a foot is 1.006 *shaku*). The Nantukiang is the biggest river which, together with its estuaries has a length of 340 Chinese *ri*, and between Hoihow and Tinangchuen a vessel with cargo of 200 piculs can navigate.

The Island faces the Luichow Peninsula across Hainan Strait. The Island has a long coast line of over 2,000 Chinese *ri*, and a few good ports. The most famous port is Hoihow. The port is situated in the northern part of the Island. The bay is shallow and has a narrow fairway, and steamers are not moored to the shore, but anchored in the offing, about three nautical miles from the port. Passengers and freight are disembarked by means of sailing vessels, so that it takes two hours at time of flood tide and five or even six hours at ebb tide or when adverse winds are blowing to reach shore. Even sailing vessels cannot directly reach shore on account of shoals, and passengers have to be transhipped from sailing vessels in small boats to land. Sometimes even the small boats are prevented from landing; then passengers are carried on the backs of coolies.

Perhaps it is due to this defect that the port has not been much developed since it was opened almost sixty years ago.

The following returns shows shipping at the port in 1933-5.

	1933	1934	1935
Vessels entered			
Chinese vessels	.. 367,462,958 tons	403,445,951 tons	442,493,660 tons
	.. 102,120,603 ..	109,135,853 ..	442,493,660 ..
Total ..	.. 469,583,561 ..	512,581,804 ..	588,677,522 ..
Vessels cleared			
(Foreign) ..	.. 346,445,661 ..	368,420,147 ..	410,453,450 ..
Vessels cleared			
(Chinese) ..	.. 123,137,700 ..	137,160,553 ..	180,225,833 ..
Total ..	.. 469,583,561 ..	505,580,700 ..	590,679,283 ..

The steamers which call at the port, and their companies are as follows:—

I.—Butterfield and Swire. (British); Steamers *Kiungchow*, *Kwantung*, *Kaying*, *Kwaichow* touching the ports, Shanghai, Amoy, Swatow, Canton, Hongkong, Hoihow, Pakhoi, Haiphong, and the Steamer *Muinam* to the ports, Amoy, Swatow, Hongkong, Hoihow and Singapore.

II.—Hocheng Steamship Co. (China) to the ports, Hoihow, Pakhoi and Saigon.

III.—Pingan Navigation Co. (China); the Steamer *Tchekan* to the ports, Hongkong, Hoihow, Pakhoi and Tsulon.

IV.—Compagnie Indo-Chinoise De Navigation. (France); the Steamer *Paul Doumer* to the ports, Haiphong, Pakhoi, Hoihow, Kwangchow-wan and Hongkong.

V.—Douglas Steamship Co., Ltd. (British); the Steamer *Haiching*, to the ports, Hongkong, Hoihow and Pakhoi.

VI.—Thoresen & Co. (Norway); the Steamers *Haihing* and *Hailee* to the ports Hongkong, Hoihow, Pakhoi and Singapore.

As regards Japanese steamers, the Osaka Shosen Kaisha opened a line linking Hongkong, Pakhoi and Haiphong in 1915, and the *Taikwa Maru* and *Reijo Maru* which were in this service called at Hoihow, but the company discontinued the service. In 1935 the Yamashita Kisen's steamers touched at the port, and at the same time the O.S.K. revived its line for a time, but both companies later withdrew the Service.

The Island is in the tropical zone, and there is no frost or snow in winter. The average temperature is 83 degrees in June, and 58 degrees in January. The rainfall annually is about 1,692 millimeters. The month of June has the greatest rainfall.

The fact that in ancient times exiles were sent to the Island shows how it lacked facilities for communication with the mainland. The Island has highways along the coast extending over 1,700 Chinese *ri*, prefectoral highways extending over 6,000 Chinese *ri*, highways in aboriginal areas, over 1,700 Chinese *ri*. These highways are, however, very primitive and no traffic is possible in heavy rain. Roads for motor-lorries scarcely serve the purpose of heavy traffic such as timber and ores, or even cattle and grain loads.

The Island has no railway. In May, 1916, Messrs. Siems and Carey concluded with the Peking government a contract to build, on Hainan, one of five railways with a total mileage of 1,500 miles, but construction work was not started. In May, 1933, Canton local authorities planned the construction of a railway, but did not carry out the plan on account of financial difficulties.

Hoihow is the biggest town in the Island. It has a business center with about 500 shops and stores and the population is put at 52,000 with about forty foreign residents. Principle goods sold are textile fabrics, shoes, rice and grain, cotton yarns, fishery products, metallic products, pork and beef, poultry, eggs, hides, brown sugar, salt, cocoa-nuts, engravings, etc.

The following are foreign establishments at Hoihow :—

Japan : Katsumada Farm Plantation.

U.S. : A hospital, Episcopal church, two schools, the Socony Oil Co.

France : A Consulate, a hospital, church, monastery and schools.

Great Britain : The Asiatic Oil Co.

There are about 200,000 aborigines in the Island. The religions are the same as those in the mainland, namely, Buddhism, Taoism, Mohamedan and Christian, of which Taoism is most flourishing. There are about 20 American missionaries. The aborigines profess no religion.

The highest school in the Island is the Sixth Provincial Normal School in the Kiungshan prefecture. There are ten middle-grade schools and 1,400 primary schools with 60,000 pupils.

The customs revenue at Kiungchow were estimated at 847,346 yuan in 1934. Next to customs duties, salt tax is the important source of revenue to the central government. In 1934, the salt tax revenue amounted to 1,768,000 yuan, or over 15 per cent of the total salt tax revenue of the Kwangtung province.

At Hoihow there are only two branches each of the Kwangtung Provincial Bank and the Central Chinese Bank. As to other money-dealers they only engage in exchange business and do not undertake loans.

There are seven gold mines, and also alluvial gold is produced in the river beds. The amount of silver production is not published, but there are a number of silver mines which are often mingled among lead mines. Other mining products are copper, iron, tin, lead, quicksilver, coal, sulphur, zinc, limestone and shale.

The salt industry is one of the most important industries on the Island. The output is estimated at 420,000 piculs a year, of which about 1,400,000 yuan in value is exported.

There is arable land of about 38,879 square Chinese *ri*. Farmers make up 80 per cent of the total population and most of them own their farm lands, which are, however, very small in acreage, so that few are rich. Many farmers have emigrated to Siam, Annam, and the South Sea Islands and become wealthy settlers. Farming in the Island is chiefly undertaken by women, children and old people.

In order to eke out their revenues they cultivate rubber, coffee, cocoa-nuts, pineapple and the like.

The trade in the Island is conducted at Hoihow. The Island imports sugar, coal, oil, matches, cement, cigarettes, drugs, paper from Kwanchow and cotton yarn, beans, noodles, wheat and flour and cigarettes from Shanghai; paper, porcelains, tinned food from Swatow, to which it exports salt, salted fish, tanned leather, seeds, cocoa-nuts, betel-nuts; to Kwanchow, tanned leather, cotton cloth, cotton; to Shanghai coarse sugar, tanned leather and ginger.

The following table gives the foreign trade of the Island for 1933-5.

	1933	1934	1935
Cattle 5,310, \$229,889	5,242, \$211,884	8,441, \$330,155	
Pigs 51,745, \$1,292,922	46,402, \$969,515	64,166, \$1,200,669	
Poultry 10,473, \$2,361	2,740, \$654	600, \$112	
Goats —	80, \$119	—	
Other animals \$5,319	\$14,414	\$11,925	
Hen's eggs 6,222,000, \$112,243	5,300,000, \$87,409	6,433,000, \$84,805	
Salted eggs 4,118, \$95,809	5,021, \$85,650	6,428, \$94,787	
Goose's feather 157 pic., \$8,801	176 pic., \$6,466	191 pic., \$10,544	
Sausage —	\$141	—	
Buffalo Hides 1,472, \$70,091	1,981, \$100,259	1,682, \$69,654	
Cattle hides 12, \$910	74, \$5,441	504, \$33,901	
Tanned cattle and buffalo leather 65, \$3,363	30, \$1,634	16, \$855	
Goat's hides 800, \$320	2,980, \$1,239	—	
Animal hides \$20,646	\$22,184	\$18,899	
Tanned leather 71 pic., \$12,255	90 pic., \$13,201	22 pic., \$3,462	
Cuttlefish \$1,315	\$300	\$29	
Dried and fresh fish 417, \$10,659	33, \$1,080	—	

	1933	1934	1935
Other fish and marine products \$13,320	\$9,371	\$34,313	
Drugs \$37,361	\$48,831	\$34,313	
Sesame —	457, \$8,235	—	
Bamboo wares \$10,303	634, \$147,368	855, \$137,338	
Fish-nets 547, \$152,789	634, \$147,368	855, \$137,338	
Tin —	96, \$25,338	836, \$180,837	
Metallic wares \$1,689	\$8,996	\$6,706	

The chief imports during the three years were as follows :—

	1933	1934	1935
Cotton cloth \$118,872	\$1,743	\$23,768	
Cotton yarn 5,083 kilo, \$5,927	2,842 kilo, \$2,684	7,650 kilo, \$7,266	
Cotton blankets 5,908, \$5,387	1,522, \$1,102	6,288, \$4,970	
Hats 1,436 dozens, \$11,052	1,531 doz., \$10,750	1,274 doz., \$8,648	
Steel-wares \$73,500	\$63,206	\$68,692	
Motor-cars —	5, \$5,050	11, \$8,254	
Motor-car bodies 15, \$7,892	18, \$9,069	26, \$11,837	
Motor-car accessories \$12,965	\$10,474	\$11,652	
Salted fish 777 pic., \$6,199	663 pic., \$2,705	498 pic., \$2,705	
Condensed milk 258, \$10,881	541, \$17,190	45,945, \$20,566	
Skim milk \$5,210	\$4,830	\$12,158	
Lactogen \$6,556	\$6,021	\$7,354	
Tea 218, \$6,569	208, \$3,587	27,454, \$9,508	
Rice 13,032 kilo, \$805,021	182,776 kilo, \$723,529	17,204 kilo, \$64,450	
Wheat flour 16,763, \$185,646	16,125, \$99,467	7,045, \$42,579	
Fruits \$6,183	\$5,791	\$5,727	
Vegetables \$13,225	\$10,113	\$10,576	
Drugs \$65,302	\$51,102	\$64,863	
Sugar 772 pic., \$5,283	1,974 pic., \$17,855	1,354 pic., \$12,934	
Fertilizer 3,309, \$25,416	2,822, \$18,617	2,736, \$19,151	
Medicine \$12,308	\$9,291	\$10,333	
Dyeing stuff \$2,667	\$4,532	\$13,230	
Paints \$21,896	\$18,357	\$22,094	
Mineral oil 1,674,979 litres, \$154,379	1,828,306 litres	1,812,225 litres	
Crude oil 317 American tons \$10,970	\$155,446	\$176,297	
Kerosene oil 1,577,542 litres \$135,681	424 American tons	594 American tons	
Lubricant oil 120,759, \$17,673	4,839 litres \$495	70,493 litres, \$6,872	
Books \$26,764	142,635, \$15,538	133,674, \$13,718	
Printing paper 982, \$14,057	\$60,459	\$41,220	
Ox bone 5,361, \$28,210	1,124, \$12,816	1,296, \$13,286	
Timber 66 cubic meters \$1,524	8,759, \$37,231	9,102, \$38,399	
Boards 2,088, \$32,474	676 cubic meters	2,334 cubic meters	
Teak 1,094, \$57,963	\$17,298	\$70,331	
Coal 447 Amer. tons \$5,132	2,199, \$47,172	2,173, \$94,202	
Glass boards 2,143 ten sq. meters \$9,180	557, \$27,062	851, \$50,139	
Cement 24,265 pic. \$37,228	127 Amer. tons \$912	216 Amer. tons \$2,014	
Rubber Shoes 99,992 pairs \$29,432	1,622 ten sq. meters	2,661 ten sq. meters	
Miscellaneous \$15,577	\$7,220	\$8,931	
	9,056 pic., \$13,372	1,984 pic., \$4,808	
	112,317 pairs \$24,195	50,951 pairs \$13,391	
	\$5,202	\$4,403	

The China Hong List

Among the books of the year "The Red Book" of the *North-China Daily News*, which is the China Hong List, assuredly must take first rank among publications of special high value to the community. The latest edition, The China Hong List for 1939, has just been issued, and in view of all the stirring events of the past two years, it is really remarkable that this year's edition is not only somewhat larger than the preceding edition of last year, but it is in fact the biggest Hong List thus far issued. The book reveals that the Port of Shanghai has not only held its own through the tense times of the past year, but has made a measurable degree of progress.

The China Hong List has been the recognized business and residential directory in China for 89 years, and all the standards of excellence built up through this long period are well maintained in this latest volume. The Hong List supplies information about Shanghai and 43 other cities and ports in China and Manchoukuo. Special sections of the book are devoted to missions, both Protestant and Roman Catholic.

A feature of value to the commercial world in the Hong List is the "Agency List." In this are recorded more than 3,500 agencies operated by Shanghai firms. By means of this the identity and address may be found of agents handling specific foreign products. The "Who's Who" section of the book, as well as the section under the heading, "Residents Directory," provide a comprehensive list of the foreign residents of Shanghai.

In these critical times, more perhaps than ever, the compilation of an adequate directory such as The China Hong List is a real service to the community. In no other way could information on such a scale be provided for businessmen and householders alike. It records one more cycle of development, change and progress in China.

Japan's Claim to be Understood

By GEORGE SALE in *The Asiatic Review*

WE know by experience the obstacles—trade rivalries, sectional hostilities and lack of understanding—which foil every attempt to establish whole-hearted co-operation between any two countries; say, for example, the two closely related Anglo-Saxons, the United States and Great Britain, or France and the United Kingdom, separated only by a narrow strip of sea. Still more difficult must it be to reconcile the ideals of the two equal but unrelated civilizations of the East and of the West. And yet in a shrinking world, bringing mankind of every race into close contact, the effort must be made lest the nations perish.

In that effort the West must take the lead, for it was the West which in the last century invaded the East seeking markets for its manufactures. In the process they destroyed the economy and disturbed the content of peoples who, in their own way, were quite satisfied to remain ignorant of Western thought, of Western progress in the production of weapons and in the arts of war.

In no quarter is there a greater need for a closer study, for a sympathetic approach to the present-day problems, for a sincere effort to understand motives and actions than in the case of Japan, with whom Great Britain was so long and so happily in alliance. She is the most powerful and progressive nation in the East, and the changes which must follow the course of current events in that part of the world will certainly not be less, but probably more, than those deriving from the Munich agreement. The fact that in 1940 Japan will celebrate the 2,600 anniversary of the founding of the Japanese Empire is a reminder of the continuity which lies in the past and a happy augury for the future. But, generally speaking, little is known abroad, and less appreciated, of the qualities developed in the long years of isolation, upon which it has been possible to graft the arts and industries of the West.

There is no satisfactory or comprehensive history of Japan—Murdoch has written three volumes, but, as a most distinguished scholar said: "Murdoch looked at Japan through spectacles made in Aberdeen in 1880." Too many people in the West have been looking at Japan through spectacles of their own manufacture, in which the glass was not always crystal clear, but often shaded by partiality, condescension or prejudice.

Japan, after her gates had been forced by the West, felt compelled to remain on her guard. Her knowledge of the Western world was not profound, but observation and experience called for the greatest wariness in her diplomatic relations.

In Japan, moral standards are different from the West, though in their view just as high. It is understood in Japan that if the motives are right they do not need, nor do they call for, explanations. Japan, very largely because of this, is an extremely poor expositor of her motives—other Oriental nations, with less constructive and organizing ability, look upon and practise propaganda as an art.

Japan has not yet fully adjusted her way of looking at life to the Western way. The West must contribute to that end, and must realize that a full adjustment is an absolute necessity for harmony in the future of world affairs—they must not leave it entirely to Japan to make the adjustment. There must be no playing favorites when the West looks to the Orient, or, if favoritism is to be shown, it should be where there are those factors of discipline, justice, orderly government and a high sense of financial obligations, both private and governmental.

The key to the understanding of Japan is appreciation of her tremendous energy and will-power, which she would really prefer to exercise in peaceful ways. Japan's change from feudalism to modernism occurred almost overnight and in comparative peace. Compare this with the French Revolution and its reign of terror, or again the more recent revolutions in Russia and Spain. The West should recognize that Japan is in the midst of a great renaissance and understand that here is a great Oriental experiment for the improvement of human life.

The West must find standards for judging Japan that give the idea of her intentions, of the impetus behind her, of the long

culture which has endured and which, though modified, has given new life to the nation. We must understand the creative spirit welling up and expressing itself in action as nowhere else in the East. Nothing can suppress the dynamic life of Japan. She is advancing and will continue to advance in her own way by her own competency.

The West owes a duty to humanity at large to understand Japan's purposes and to improve their knowledge of what Japan means to the world as an example to the Orient in terms of social betterment and progress. "New wine cannot be put into old bottles," and so Japan's aroused spirit may not be held within her old boundaries.

It was not Japan's fault that she was roused from her seclusion and isolation by American guns and her dormant creative spirit awakened. In 1868 the population was 30,000,000—in 1938, 73,000,000—with a yearly increase of one million souls she must expand either commercially or territorially. Birth control runs counter to the deep seated reluctance to interfere with the growth of the center of her social structure—the family.

Agricultural improvement and the extension of arable lands has been applied to the maximum. The farmer, traditionally and actually the backbone of national welfare, is being progressively impoverished. Young men and women from the country crowd into the industrial and commercial spheres, leaving an increasing concentration of non-producers, the very young and the very old, in the rural areas.

Between 1875 and 1920 Japan added to her territory the Kurile Islands in 1875, the Loo Choo Islands in 1879, Formosa and the Pescadores in 1895, the southern half of Sakhalin in 1905, Korea in 1910, and, under mandate, the Caroline, Marshall, Marianne and Pelon Islands in 1918, a total of 112,000 square miles. By way of comparison it is interesting to note that the United States, within a shorter period of time, extended her sovereignty by more than 125,000 square miles—namely, the Hawaiian Islands in 1898, Puerto Rico, Guam and the Philippine Islands in 1899, American Samoa in 1900, Panama Canal Zone in 1904 and the Danish West Indies in 1917.

Unfortunately the territories annexed by Japan did not relieve the problem. Emigrants could not compete with the native labor, and climatic conditions were not attractive, to which must be added a reluctance to leave the homeland. When they sought to emigrate to other countries in which conditions were more attractive, they found the doors of nineteen countries legally closed.

Thus the great problem, so vital to Japan, remained unchanged. It was placed on the agenda and frankly discussed at the Conference of International Pacific Relations held in Kyoto in 1929, and at subsequent conferences, but on each occasion met with nothing more than academic consideration. Not only the members of the conferences but statesmen of the West entirely failed to perceive the urgency of the problem so fundamental in the formation of Japan's foreign policy.

The last possible solution and only alternative was an industrial expansion, a drive for efficiency in manufactures and a bid for a larger share in world trade, following in this way the course pursued first by Great Britain and then, in turn, by Germany and the United States. The peak of this effort was seen in 1936, when a total of exports of Y2,800,000,000 was reached. Imports in the same year were Y2,930,000,000. Though Japan was such a good customer and so, on balance, cannot be described as a menace, special restrictions on Japanese goods were imposed by the Governments of forty countries. Even the United States took part in this campaign, despite the fact that Japan's purchases from that country in 1930 were twice as much as sales.

Thus confronted by barriers in every quarter of the globe, Japan decided that she must turn to Asia, particularly as a source of raw materials and as a market for her manufactures. Geographical propinquity, similarities in the written language and intimate knowledge of market requirements give Japan special advantages. Japan has relatively more at stake in China than any other foreign

country. Her trade with China comprises 24 per cent of her total foreign trade, whereas the United States' trade with China is less than four per cent of her total and Great Britain's less than two per cent. Two-thirds of the foreign population of China are Japanese. It is not necessary to emphasize further the special position of China *vis-à-vis* Japan and the vital importance of her trade with China in relation to her economic life and her effort to support increasing millions through industry.

From the Washington Conference in 1922 to the resignation of Shidehara as Foreign Minister in 1931, Japan strove most earnestly to conciliate the Chinese and to accomplish her objectives by peaceful methods. She accepted in embittered silence the abrogation of the Anglo-Japanese Alliance of 1902 to make way for the Washington Treaties, which were supposed to prepare the ground for the reduction of China's armies and to promote peace in China, but subsequently forgotten by the guarantors. At the request of the other Powers, she agreed to return Tsingtao to China, abandoning many highly valuable economic and political concessions as a gesture of co-operation with the West and of sincerity and friendship towards China, in the hope of furthering friendly relations between the two countries and promoting the welfare of the Orient. She also agreed, though not without protest, to limit her navy to an inferior ratio to that of the United States and Great Britain, thus putting peace before "face"—a generous gesture to those who know the Far East.

But what was the result of all Japan's efforts to establish good relations with China? In 1927, when British and American gunboats were forced to open fire in Nanking to protect their nationals from being overwhelmed and their property from loot, the Japanese gunboats remained aloof, leaving their nationals unprotected. The Japanese policy was mistaken for weakness, and in the period after 1927 the Japanese contend that the Chinese increased their opposition to Japan. Well-organized anti-Japanese propaganda was carried on more strongly as the years passed by in the textbooks used in the schools, from the primary to the higher, in the military as well as in the economic groups.

Japan's political relation with Russia is another unsolved problem. Since 1857, when, through the action of the British Navy, Russia was compelled to evacuate her settlement on the island of Tsushima in the Sea of Japan, Japan has always found herself opposed to Russia. In this long struggle others have interfered, such as on the occasion of the Treaty of Shimonoseki in 1895 when Germany, France and Russia intervened to force Japan to return the Liaotung Peninsula, which shortly afterwards Russia appropriated for herself.

The Russian form of government may have changed, but the urge to expand towards the East remains the same. The influence and position of Borodin and other Russian advisers in the councils of the Kuomintang and the spread of Soviet influence and tutelage in Outer Mongolia and Sinkiang, with outposts spreading rapidly further east, raised the understandable fears of Japan. England has for centuries maintained that she cannot allow Belgium and Holland to be dominated by any other Power, and the United States has proclaimed her Monroe Doctrine. Similarly Japan can never allow the Soviet to encroach upon China.

Japan sincerely believes her true mission is to be stabilizer in the Far East. She hopes to fulfil this rôle by peaceful methods, but, if necessary, will not shrink from war to accomplish the task which she believes just as much to be hers as England believes in the "white man's burden."

The Japanese feel they are conducting a crusade aiming at the pacification of the Far East, but, as often before in history, the crusade falls far short of the ideal inspiring the crusade, and, to the sorrow and disappointment of their friends, the excesses of the Japanese armies on various occasions and their treatment of the Chinese population has aroused a spirit of enmity in China which will take many years and generations to pacify, and has succeeded so far in uniting the various factions in China as they have never been united before.

The military operations in China have inevitably clashed with the foreign trading interests. In the areas which the Japanese armies have won they have imposed many restrictions and controls and exercised discrimination against foreign interests, chiefly American and British. The Japanese viewpoint is that they are engaged in a life-and-death struggle and such mundane matters as trade should not count. Foreigners, on the other hand, whose chief interest in China is trade, are greatly incensed and upset at

the roughshod way in which their rights, legal and traditional, have been over-ridden.

The Japanese armies, especially those who fought at Shanghai, feel they have gone to great lengths to safeguard foreign property, even though it entailed delay in obtaining military objectives and involved greater casualties, and they feel resentful that there has been no public acknowledgment of this on the part of Great Britain or America, but rather every opportunity is taken to complain against the restrictions, which the Japanese feel have been imposed of necessity from military considerations.

And so the gulf widens, tension grows and incidents multiply. The majority of the Press in Great Britain and America have assumed Japan is the aggressor, and their criticisms have, in the minds of the Japanese, been unfair and biased. It is not so much that they resent criticisms, but the tone and manner of them. This failure of the Press to comment impartially is of long standing. As far back as 1850 Lord Derby had cause to say with regard to the unjustifiable attacks on Prince Louis Napoleon: "The weakest part of the Freedom of the Press is exhibited in the domain of foreign affairs. If they aspire to exercise the influence of statesmen they should speak as such." Strengthening their belief that the British and American Press is biased is the sympathy given to Japan in other quarters.

The Japanese are always ready to listen to fair criticism, and there has been much done which, if fairly criticized, would have been accepted and remedied by Japan, but as long as the tone of the Press and the spirit of their criticism is partial, it will have no influence on the minds of the Japanese.

The Japanese know as well as Western people that to invade another country's territory or to kill a man is not right. No one in Japan, even the military party, is enjoying bombing the Chinese, nor are they willing to risk their lives in such a campaign unless there is no alternative.

From the military point of view Japan expects to be able to dominate China or a large part of it. They have already captured Peking, Nanking, Shanghai, Hankow and Canton, and the railways connecting these towns with the coast, and with the help of their navy they can hold the ports, chief towns and railways, and China will not be able to drive them out, and neither Great Britain nor America will have the will or the wish to do so.

Many people think that Japan will be unable to stand the strain financially of this great venture, but so far the facts are proving the contrary. Japan, under the able direction of her Finance Minister, Mr. Ikeda, has introduced a system of control which limits and adjusts imports to balance exports. If the exports decrease, so must imports be cut down and rationed, but always with preference in favor of military and naval requirements. In this way the surplus of imports over exports for the nine months up to the end of September, 1938, has been reduced to less than six millions sterling, and this excess is more than set off by newly mined gold, to say nothing of the trade between October and December, months during which exports almost always exceed imports.

Japan's economic strength lies in the enormous difference in the standard of labor and living as compared with the Western world. Few people appreciate the great increase of industrial production in Japan during the last decade. Taking the monthly average of industrial production for the year 1928 as 100, we find the figures for 1937 ranging about 240. This phenomenal increase of 2½ times is not approached by a long way in either Great Britain or America, and coupled with that is the inherent willingness of the people to face cheerfully restriction and hardship, if needs must, for the sake of Emperor and country. Japanese industry, having been stripped of waste and luxury and reinforced by the introduction of substitutes through necessity, will, they claim, be fully equal to the task of supplying the requirements for the war in China.

Probably all individual effort will be more or less State-controlled and the economic policy or structure of Japan altered in such a way as to bring about complete marshalling of all economic effort of individuals for the sole benefit of the State. There will be no faltering, no wavering, until they have reached their goal.

On the other hand, the task of economic reconstruction and rehabilitation of China will be far beyond the resources of Japan unless she can receive help and co-operation from Great Britain and America, and this will not be obtained unless the peace terms to China are magnanimous and generous and recognize not only the territorial integrity of China, which Japanese statesmen have

(Continued on page 54)

Backing the Wrong Horse

By Capt. M. D. KENNEDY in *The Empire Review*

AT a time when British interests are being sadly flouted and mutual recriminations are the order of the day, it is but cold comfort to reflect that these things might never have been if the substance of the Anglo-Japanese Alliance had not been exchanged after the Great War for the shadow of Anglo-American co-operation in the Far East. Events have shown that those who, in 1921, gave warning of the dangers and difficulties to be apprehended if the Alliance were scrapped, were better judges of the situation than those whose advice was followed. Future historians may well decide that this post-War re-orientation of British Far Eastern policy provides a striking illustration of the observation made by Sir Edward Grey in his memoirs, that "British Foreign Ministers have been guided by what seemed to them to be the immediate interest of this country, without making elaborate calculations for the future."

In saying this, one is reminded of Lord Salisbury's admission towards the close of last century. Animadverting on British policy towards Russia and Turkey in past years, he harked back to the Crimea and declared that we had "put our money on the wrong horse." It is tempting to wonder if some future British statesman, reviewing British policy in the Far East since 1921, will give vent to a similar feeling of regret regarding our post-War policy towards Japan and China.

In certain respects, Britain may be said to have adopted much the same attitude towards China as was adopted towards Turkey. In each instance, the maintenance of territorial and administrative integrity has been one of her principal objects. In itself, such an object calls for no criticism. It is the means taken to achieve it that is open to question.

Following the Napoleonic wars, Castlereagh set himself, amongst other tasks, to maintain the integrity of Turkey, and successive British Foreign Secretaries continued this policy throughout the greater part of the century. Russia, like Japan in the case of China, considered that Turkey was in a hopeless state of disunity and decay; but Palmerston, writing to Bulwer in 1839, put forward his belief that "if we can procure for it (the Turkish Empire) ten years of peace under the joint protection of the five Powers, and if those years are profitably employed in reorganizing the internal system of the Empire, there is no reason whatever why it should not become again a respectable Power."

The similarity between this view on Turkey 100 years ago and the British belief expressed at Washington in 1921 regarding the best means to bring about the regeneration of China is self-evident. The Nine-Power Treaty of 1922 with its "self-denying ordinance" was, in effect, a modern version of Palmerston's proposal in regard to Turkey. Japan's present views on the utility of this pact are not unlike those of Russia a century ago in regard to Palmerston's suggestion. It may not be out of place, therefore, to utter a warning; for, as Professor Seton-Watson points out in his *Britain in Europe—1789-1914* Palmerston's *idée fixe* regarding Turkey and its consequent effect on Anglo-Russian relations was "one of the main contributory causes of the Crimean War—the most unnecessary war waged by Britain during the past century." This *idée fixe*, he goes on to say, "was taken over, twenty years later, by Disraeli and the Conservative Party and became mainly responsible for the disastrous Eastern crisis of the 'seventies."

It is to be hoped that history will not repeat itself. There are, nevertheless, sufficient similarities between the development of Anglo-Russian relations over the question of Turkey last century and the course of Anglo-Japanese relations over the question of China since the abrogation of the Anglo-Japanese Alliance to warrant the closest attention of those responsible for the formulation and execution of British policy in the Far East.

Like China in recent years, Turkey secured the sympathy of the Liberal West, too naive or too ill-informed to foresee that reform was to remain very largely on paper. The present-day attitude of the Western Powers towards Japan and China is clearly reflected in Professor Seton-Watson's comment on this sympathy. "It was natural enough," he remarks, "that in all Liberal and

advanced circles of Europe there should be acute suspicion of the Russian autocracy. It was a fatality that that autocracy should have stood for progress and civilization in the Balkans, and that its evil reputation should have betrayed the West into supporting a still more odious and decadent tyranny in Turkey."

China, during the past few years, may have carried out more reforms than did Turkey; but, like in the case of Turkey, large numbers of the reforms proclaimed remain on paper. For the moment, Chinese misdeeds and Chinese arrogance, which received considerable prominence until a very few years ago, are conveniently forgotten, and China figures in the popular imagination as something akin to a knight in shining armor, fighting a lone battle for western ideals and the principles of modern civilization. Like Turkey last century, China is now basking in the sunshine of western sympathy and admiration, while Japan, like Russia in those days, is the villain of the piece. Yet it was Russia, not Turkey, that "stood for progress and civilization in the Balkans," and it is Japan, not China, that has hitherto stood for progress and civilization in the Far East.

To quote Professor Seton-Watson once more. "The Tsar, as near neighbor and possible heir of Turkey, was imbued with the idea that nothing could save Turkey from speedy destruction, while British statesmen saw the Turks in a halo and maintained a pathetic belief in their reformability." In the case of Turkey and China alike, Britain, being far removed, has been in a position to take a more detached view than such near neighbors of these two countries as Russia and Japan respectively. In the case of China, Japan's position has been rendered all the more acute in recent years by a not unfounded fear of Soviet machinations in that country and by the belief that, unless steps were taken in time to forestall her, Soviet Russia would extend her control in such a way as to offer a serious threat to Japan's own safety and welfare. It is this fear of Soviet Russia—exaggerated possibly, but none the less real—that has been the root cause of most of Japan's actions in Manchuria, Inner Mongolia and China proper since 1931.

Her demands on China have been not unlike those of Russia on Turkey in 1853. The Russians at that time, ostensibly bent on securing equality of treatment for Greek and Latin Christians, "pressed the Porte for a new treaty, extending the rights conferred upon Russia in 1774 into what would amount to a Russian protectorate of all Orthodox Christians; and if Turkey would then conclude a defensive alliance on lines resembling those of 1833, the Russian fleet and an army of 400,000 men would be pledged to undertake her defence when required." In like manner the Japanese, with the declared intention of ensuring the peace and stability of East Asia, sought to obtain China's co-operation and collaboration in stemming the spread of sovietization and her acceptance of advice and assistance, which would give Japan virtual control of North China.

Unfortunately Japan, losing patience with China's dilatory tactics and evasion of her demands, resorted to action which placed her in the wrong in western eyes and caused a swift revulsion of feeling in favor of the Chinese. In this we have an almost exact parallel with Russia's action in 1853, when the Tsar, "losing patience at the Porte's evasion of his other demand" and at the "cautious and dilatory game" played by the Turks, issued a fiery manifesto summoning his subjects to "go forth to fight for the Orthodox faith" against "the obstinate and blinded" Ottoman Government—"a high-handed action which at once placed him in the wrong both at Constantinople and in the west, and caused a swift revulsion of public opinion in favor of the Turks."

A more detailed study would no doubt reveal many another parallel between the Turkish problem of last century and the problem of China since the close of the Great War. Two more instances must suffice.

In a conversation with the British Ambassador in January, 1853, the Tsar proposed a frank discussion with Great Britain as to the fate of Turkey, in order to avert chaos and "the certainty of a European war" if the catastrophe took them unawares.

Without ruling out the possibility of going to Constantinople as "a tenant for a limited period," he undertook "not to establish himself there as proprietor." Though not by any means an exact parallel, one can recognize an echo of this in the attempt made by Japan in the summer of 1937 to open negotiations with the British Government for a friendly understanding on the question of China and the Far East in general. The Tsar's undertakings regarding Constantinople, too, bear a striking resemblance to Japanese declarations with regard to their occupation of North China and Shanghai being only "temporary" or "semi-permanent."

As a final example of similarities between situations raised by the Turkish question and those brought about in recent years by Sino-Japanese disputes, it is instructive to turn to the Russo-Turkish War of 1828-29. Then, as now, there was a great deal of talk about steps to check "the aggressor," and there is a very modern touch in Wellington's lament: "No one can expect us to go to war single-handed to prevent Russia from taking possession of Constantinople, while all Europe look on and take no step." It seems to be the fate of British Foreign Secretaries to find their country expected to take action while others sit back and merely look on; for, in addition to Turkey and China, one calls to mind such instances as those of Schleswig-Holstein and Abyssinia.

Interesting, however, though it may be from an academic point of view to note how history so nearly repeats itself at times, little profit is to be gained by quoting these similarities unless they are studied with a view to learning, and taking to heart, the lessons to be derived from them.

We may disapprove of Japan's present actions, but it is well to remember that a somewhat similar mood of self-assertive nationalism was typical of ourselves in Palmerston's time. We may now have outgrown this mood, but we are still inclined, as Gladstone once said of Palmerston, to "trumpet forth our virtues" and abuse those who hold different opinions. Gladstone's criticism, in the 'eighties, of our readiness to claim "pharisaical superiority over other nations" would not be wholly unmerited even to-day. National pride is very right and proper; but when dealing with a proud and sensitive nation like Japan, far more harm than good is done by pharisaical denunciations and school-masterly admonitions, and it would be well to consider how we ourselves would react—and have, in fact, reacted in the past—to similar denunciations and reproof from a foreign Power. We would, in short, be better advised to adopt the methods and principles of Canning than those of Palmerston. Most of our worst difficulties since the close of the Great War, both in regard to the Far East and to foreign affairs in general, have been brought about by disregard of the elementary principles of diplomacy laid down by that great statesman: never to take up any position which we are not either ready or able to defend in case of need; never to enter into an agreement unless satisfied that it can be implemented; and never to indulge in minatory warnings and threats unless able and ready to carry them out.

All this is but elementary wisdom and common sense, yet how frequently have we neglected to follow these principles in post-War years? Agreements and undertakings, reflecting greater credit on the heart than the head, have been concluded with enthusiasm, and in dealing with such countries as Japan and Italy we have, to no small extent, laid ourselves open to the charge of "lecturing, scolding, blustering and retreating" levelled by Lord Derby in 1864 against Russell for his handling of the Schleswig-Holstein question. Our threats against Japan and Italy over China and Abyssinia have much in common with those uttered by Russell and Palmerston seventy odd years ago in connection with the Polish and Danish questions, and in each instance we have had to climb down to a greater or lesser extent. Not only so, but we have, by our verbal sympathy, raised false hopes in the breasts of Poles, Danes, Abyssinians, and Chinese alike, despite such warnings as that of Napier in 1863, that "unless Britain is ready to fight, she should say nothing to encourage the Poles to a futile resistance."

While it is a section of the Press and of the people, rather than the Government, that is primarily to blame in the present instance for lecturing and threatening Japan, it is well to recall that it was the people, not the Government, who wanted the Crimean War; and it was ill-informed public opinion, not the Government, that plunged England into that war. It is to be hoped that "ill-informed public opinion" will never plunge Britain into war with Japan over the question of China as it did with Russia over Turkey, but it is well to keep the lesson of the Crimea in mind as a salutary warning.

There are those who would argue in favor of such a war, as Palmerston did in defence of the Crimean War, that the object was to free the weaker nation from eternal dictation and to raise a firm barrier against future aggressions. Such a line of argument, however, would only hold good if it applied to Soviet Russia as well as Japan, for there is much truth in the Japanese contention that, owing to weakness and, in normal times, lack of cohesion, China is destined to come under the influence of one or other of her two powerful neighbors. Japan is determined that China shall not be Bolshevikized and, however much one may question the wisdom of her policy, she herself is convinced that the only way to prevent this is to compel China to accept Japanese aid in stemming the Soviet tide.

While British sympathy for China is, in present circumstances, perhaps but natural, Canning's assertion at Plymouth in 1823 that, in the conduct of political affairs, "our ultimate object must be the peace of the world," holds as true to-day as it did 115 years ago. With Soviet Russia ready and anxious to exploit the situation to the full to her own advantage, it can hardly be imagined that the cause of world peace would be advanced to any very great extent if a war were to be fought for the sole purpose of freeing China from Japanese dictation and raising a firm barrier against future Japanese aggression.

Japan-Korea Tunnel Planned

An engineering project that would rank with the Panama Canal and the Golden Gate Bridge for sheer magnitude—a 72-mile submarine railway tunnel linking Japan and Korea—is being considered seriously by the Railway Ministry.

Already past the visionary stage, actual tests of the earth strata, financial estimates and rough blueprints have brought the project a step toward realization. Engineers who have been studying the plan estimate that a single-track tunnel, 180 feet below the sea bottom, would cost Y1,000,000,000. It would run under the Chosen Channel at its narrowest point.

The plan would fit in with the Government's Asiatic economic and industrial policy, providing quick freight and passenger transportation to Korea, Manchoukuo and North China, it is pointed out. With ever-increasing industrial expansion on the continent, requiring huge shipments of machinery and equipment, and an even greater outflow of raw materials and finished products when the full exploitation of the area is under way, a railroad is regarded as the only solution to the transportation problem. Even now, the ferry service is sorely overtaxed, owing to the growth of Manchoukuo and the China incident, the *Chugai* says.

The time required by the Shimonoseki-Fusan ferries to negotiate the channel is seven and a half hours. Trains could cover the distance in two and a half hours with twice the pay load.

Tests carried out since August by Dr. Tsuranuki Watanabe and Mr. Koichi Hirota, engineers of the Railway Ministry's construction bureau, indicate that subterranean conditions at either end of the projected tube would be favorable.

The Shimonoseki-Moji railway tunnel, now under way, is expected to reveal all the engineering problems likely to be encountered in the major project under consideration, which probably would not be undertaken before the former is completed.

Like the Shimonoseki tube, the Korean tunnel would be single-tracked at the start, possibly with spurs at two or three points to permit trains to pass. It later could be double-tracked.

Japan's Claim to be Understood

(Continued from page 52)

repeatedly promised to observe, but also take into consideration the new national spirit conceived in the agony of the present struggle—unless peace can be brought about on such terms the alternative will be that trade will dwindle and dwindle, and that vast area consisting of Japan, Manchoukuo, Korea, Formosa and that part of China stretching down to the Yangtze basin become an economic wilderness like Soviet Russia, and the Japanese will find they have failed in their crusade. But if Great Britain and the United States will make a serious effort to understand the problems and difficulties of Japan there is a great rôle for them to play in assisting China and Japan to revive trade, build up good government and restore peace in the Far East.

Present Day Trade Currents in Manchoukuo

As is usual with new countries, Manchoukuo is in need of great quantities of construction materials for development of her economic resources. Thus each year she imports a great deal more than she can export, but never before has her imports reached such a figure as last year.

According to official returns just published, total imports last year reached 1,271 million yuan against exports of 714 million, leaving an unprecedentedly heavy adverse balance of 556 million yuan. Comparing these figures with the preceding year, we find an increase of 69 million yuan in exports, and 383 million in imports. The excess in imports increased 314 million yuan over the preceding year. The imports from Japan were larger by 312 million yuan than the preceding year, and constituted the major cause of the heavy adverse balance of trade of the year. In the trade with third countries other than China, exports declined by 26 million yen while imports increased heavily, causing an adverse balance of 31,400 in place of the favorable balance of the preceding year.

Reasons for the increase of the adverse balance over last year are found in the following explanations:

(1) With the progress of the economic five year program, imports of construction materials, chiefly from Japan, increased by some 300 million yuan.

(2) Imports from China of such commodities as tobacco leaves, and raw cotton, increased by about 30 million yuan.

(3) Decline of trade with third countries, that is, countries other than Japan and China. The exports to those countries fell off by 30 million yuan in the year, while imports from them increased by about the same amount, increasing cash payment by 60 million yuan.

From the experience of last year, it is expected that imports from countries other than those of the yen bloc will be strictly controlled as a measure for ameliorating the trade situation of the country. There is, however, little hope of much curtailment of imports from Japan, for Manchoukuo is in need of great varieties of commodities in large quantities for development of economic resources. During last year strict control was exercised by the Japanese Government on the export of cotton, woolen, rayon, silk and rubber products to countries of the yen bloc, and this control will be further intensified during the current year. The demand for those commodities has considerably increased in Manchoukuo in recent years, and export control by Japan will seriously be felt in Manchoukuo.

(4) The export of staple products was satisfactory on the whole; ground nuts increased 10 million yuan and soya bean cakes were 40 million yuan larger than 1937, and further increase is expected for the present year. A slight fall was experienced in the export of iron ore and coal to Japan. But it was due to no other causes than the shortage of labor, and this year a material increase is expected in this quarter. Manchoukuoan authorities look to the substantial increase in the export of iron ore, coal and food products for adjustment of trade position with Japan.

The total export to third countries of soya beans showed an increase of 150,000 tons over the preceding year at 1,380,000 tons. On the other hand, soya bean oil, perilla oil and other vegetable oils witnessed recession owing to the decline of European market in vegetable oils, and the fall of exchange of Chinese legal currency, and general depression of business. The authorities are studying how they can improve exports to third countries.

The imports of steel and iron and machines did not reach the anticipated amount, due probably to the fact that about 20 per cent was paid previously as bargain money. If this pre-payment is added, the total figure will be increased accordingly. The trade returns for 1938 are given below.

THE TOTAL TRADE

(In 1,000 of yuan)

1938 1937

Exports	..	..	714,374	645,298
Imports	..	..	1,271,191	887,412
Excess of imports	..	..	556,817	242,114

TRADE WITH JAPAN

Exports	..	..	411,442	321,512
Imports	..	..	979,184	666,271
Excess of imports	..	..	567,742	344,758

TRADE WITH CHINA				
Exports	..	..	118,052	112,753
Imports	..	..	75,727	39,324
Excess of exports	..	..	42,325	73,429

TRADE WITH GERMANY				
Exports	..	..	50,298	—
Imports	..	..	37,229	—
Excess of exports	..	..	13,169	—

TRADE WITH OTHER COUNTRIES				
Exports	..	..	134,482	—
Imports	..	..	179,051	—
Excess of imports	..	..	44,969	—

TOTAL EXCLUDING JAPAN AND CHINA				
Exports	..	..	184,880	211,033
Imports	..	..	213,280	181,818
Excess of exports or imports	..	..	31,400	29,215

PRINCIPAL ARTICLES OF EXPORTS

(In 1,000 of yuan)

	1938	1937
Soya beans	230,846	226,076
Other Beans	14,680	12,542
Millet	19,962	14,197
Kaoliang	18,844	9,843
Indian corn	17,710	8,526
Ground nuts	12,115	16,370
Perilla seeds	7,270	7,885
Sesame seeds	2,609	4,383
Bean cakes	70,067	62,336
Bean oil	14,100	25,343
Perilla oil	4,671	9,315
Sesame oil	448	2
Coal and briquette	27,859	85,610
Magnesite	4,671	9,315
Antimony sulphide	16,568	9,672
Pig's bristles	5,484	6,541
Others	190,602	110,813

PRINCIPAL ARTICLES OF IMPORTS

1938 1937

Raw rubber	2,019	745
Coal tar and dyestuffs	5,542	6,576
Rice	9,328	8,754
Fish and marine products	22,801	20,585
Sugar	28,607	21,293
Tea	6,342	7,121
Tobacco leaves	7,740	7,595
Mats	5,067	3,902
Timber	23,753	13,126
Raw cotton	42,610	32,202
Cotton textiles	84,797	104,645
Woolen textiles	22,633	18,998
Silk and rayon tissues	58,896	30,646
Gunny bags	20,910	19,274
Paper	35,715	24,865
Iron and steel	121,974	6,430
Copper	9,056	6,176
Aluminum	2,630	2,236
Tin	1,650	3,701
Electric machines, etc.	36,735	29,962
Vehicles and parts	79,791	44,562
Machines	101,648	53,859
Others	504,753	353,161

Total 1,271,191 887,412

Japanese Capital Investments in Manchoukuo

Japanese capital investments in Manchuria may be divided into two periods, i.e., before and after the Manchurian Incident of 1931. According to the Manchurian Railway Company the Japanese capital invested in Manchuria before the Incident stood as follows

In 1930 :—	(000 omitted)
Railways	Y425,216 (loans Y140,921) 26.3%
Harbors	83,201 5.2%
Transportations	28,036 1.7%
Agriculture, mining and forestry	258,990 (loans Y63,365) 16 %
Industry	110,121 6.8%
Commerce	117,753 7.3%
Electricity and gas works	37,283 (loans Y1,155) 2.3%
Banking	106,705 6.6%
Trusts	97,634 6 %
Public works	302,509 18.7%
Others	49,459 (loans Y7,964) 3.1%
Total	Y1,616,966 100%

Of the above, direct investments amount to Y1,403,561 (86.9 per cent) while the sum advanced as loans amounts to Y213,405 (13.1 per cent). Japanese economic influence in Manchuria has been expanded with the Manchurian Railway Company as the center, and this fact explains how the greater portion of the capital was invested in transportation and communication organs.

Before the Incident, Manchuria had been a market for foreign and Chinese capital investments. Of the foreign investments Japanese capital headed the list. The following returns shows foreign capital investments in Manchuria (Japan's investments not included).

(000 omitted)			
Soviet Russia	Y465,015	82.5%	Y53,569,000
Great Britain	39,590	7.0%	278,444,000
U.S.A.	26,400	6.5%	196,603,000
France	21,086	3.8%	158,147,000
Sweden	850	—	183,009,000
Denmark	157	—	200,201,000
Total	Y553,098	100%	285,409,000*
			Y1,355,384,000

Capital Investments after Incident

During the period 1932-1937, capital invested in the form of securities and other loans amounted to Y1,504,000,000. During the same period there was almost no capital invested in North China, and thus it may be concluded that Manchuria absorbed nearly the whole sum of Japanese capital investments abroad.

As regards the route for the flow of the greater portion of capital during the period under review it was nearly the same as before the Incident, namely, the Manchurian Railway Company.

In 1937, however, the route for flow of capital assumed a somewhat changed form. During the period 1932-1936, investments for the Manchurian Railway Company and its satellite companies occupied 68 per cent of the whole sum of investments, whereas in 1937 the investments for the railway and others connected with it only amounted to 54.25 per cent, and in the same year capital directly invested in Manchoukuo was increased to 21.52 per cent, that is, an increase of 6.79 per cent over the period of 1932-1936. In one sense this fact shows that Manchoukuo has so much been freed from her dependency on the Manchurian Railway Co., and strengthened her economic stand, but practically it was due to the Industrial Five Years' Plan which was started in 1937.

How Capital was Distributed

The following returns shows the branches of industry and others in which Japanese capital was invested.

(In thousands of yen)

	1932	1933	1934	1935	1936
Mining	—	2,500	21,662	20,412	1,225
Engineering	2,580	65,713	147,270	64,478	159,769
Agriculture and forestry	25	62	580	37	2,687
Fishery	—	12	620	740	—
Transportation	85,200	298,398	179,145	88,270	259,952
Communications	—	29,375	8,000	7,000	6,875
Colonial	—	—	—	—	16,500
Land and estate	3,000	375	3,037	8,540	2,950
Commerce	1,410	1,865	3,170	11,307	11,764
Exchange	250	1,200	125	—	125
Credit	15,025	7,020	7,924	1,025	4,302
Others	239	100	287	597	3,069

It will be seen that in 1932-1933 capital was chiefly invested in communications and transportation, showing that great emphasis was placed in this period on transportation and communications, which form the basis of the Japan-Manchoukuo economic bloc. Thus building of important trunk railway lines, enlargement of roads, communication facilities, etc., and rational changes of monetary organs were first undertaken. In 1932 the Central Bank of Manchoukuo was inaugurated, and in 1933 the Manchoukuo Telegraph and Telephone Company was established. The Manchurian Railway Company also accelerated the construction of new lines. In 1934-1935 the payment for shares of mining and engineering companies was increased, nearly approaching in its amount to the capital investments in the construction of communication organs undertaken by the Manchurian Railway Co.

The feature of capital investments in Manchuria during the first constructive period was advent of capital into mining and engineering branches, such as chemical, electricity, and metallic industries, in addition to investments in the construction of communication organs with railway lines heading the list. This new tendency was also noticeable in 1937.

In addition to the capital flow into Manchuria amounting to Y1,500,000,000, in the form of securities and loans, a fairly big amount of capital was invested after the Incident in the form of establishment of branch offices by business companies, establishment of private concerns, investment in real estate, etc. The investments of this category amounted to Y78,000,000 in 1933-1937.

In treating with capital investments in Manchoukuo the Japanese Government's outlay in connection with the Manchuria Incident must be taken into account. They were as follows:

1931 .. .. ..	..	..	..	..	..	Y53,569,000
1932 .. .. ..	..	..	..	..	..	278,444,000
1933 .. .. ..	..	..	..	..	..	196,603,000
1934 .. .. ..	..	..	..	..	..	158,147,000
1935 .. .. ..	..	..	..	..	..	183,009,000
1936 .. .. ..	..	..	..	..	..	200,201,000
1937 .. .. ..	..	..	..	..	..	285,409,000*
Total .. .. ..	..	..	..	..	..	Y1,355,384,000

* (Estimated in the Budget for the current Year).

Of this sum about Y600,000,000 has flowed into Manchoukuo. Then it may roughly be estimated that about Y2,185,000,000 of Japanese capital flowed into Manchoukuo since the Manchurian Incident. Of this sum Y1,504,174,000 has been invested in securities, and other forms of loans, Y80,000,000 in others, Y600,000,000 in the form of the Government's outlay in connection with the Manchurian Incident.

If we add to this the sum of Y1,617,000,000 invested before the Incident, the total amount of Y3,800,000,000 was invested in Manchoukuo for the economic development of the country.

The sum was reduced to Y2,185,000,000 since the Incident. Now the question is how much of this sum has been repatriated to Japan. There are two methods of estimating this turn-over of the invested capital. One method is to include payments for exported goods. The other is to estimate only the receipts of interest, and dividends for securities, loans, etc. According to the first method Manchoukuo has paid to Japan as follows:

	(In thousands of yen)				
	Balance of Trade	Interest, dividends, profits realized by enterprises	Remittance by Japanese	Transportation, insurance, postal-savings	Total
1932	47,146	38,000	13,500	23,800	122,446
1933	130,167	60,584	14,746	17,803	223,300
1934	189,927	59,712	17,210	28,258	295,107
1935	239,383	83,805	17,988	32,426	373,602
1936	258,609	97,184	18,000	30,000	403,793
Total	770,940	339,285	81,449	132,287	1,418,248

Supposing that Y2,100,000,000 had flowed into Manchoukuo up to 1936 the sum of only about Y200,000,000 must be left over in Manchoukuo. This shows how great turnover of capital has been, and it also shows the capital investments in Manchoukuo presuppose re-investment through turnover of capital. From a pure economic point of view, the percentage of yield for securities, loans, etc., must be a fundamental condition for prompting re-investments of capital in Manchoukuo.

The following returns shows the repatriation of Japanese capital in the form of yield.

	(In thousands of yen)				
	I	1936	1937		
Interest and dividends on Manchoukuo Securities	86,194	98,585		
Interest on Manchoukuo National Bonds	5,470	8,545		
Interest on local loans and debentures	33,982	37,305		
Dividends paid by companies in Manchoukuo	46,724	52,735		
II					
Interest for deposits of and borrowings from outside of Manchoukuo	8,486	12,577		
III					
Profits realized by enterprises which have headquarters outside of Manchoukuo	8,629	16,199		
Total	189,485	219,946		

Japan's capital investments in Manchoukuo since the Incident have reached over one billion and a half yen, and now the question is how the basic condition which has enabled Japan to make such a huge sum of capital investments has been changed. The basic condition in question had been an increase of idle money due to

economic depression in Japan since 1929. According to a survey made by the Tokyo clearing House the figures showing an increase of idle money since 1931 is shown in the following table:—

(In millions of yen)

	Banks	Trusts	Insurance Companies	Post Office Insurance	Gov. Deposit Bureau	Total
1931 ..	151	335	1,144	253	1,967	3,852
1932 ..	1,060	343	1,203	323	2,113	5,043
1933 ..	2,292	459	1,395	463	2,350	6,959
1934 ..	3,240	676	1,631	585	2,563	8,695
1935 ..	3,853	772	1,631	585	2,698	9,539

The above figures show the surplus amounts above the maximum deposits legally fixed. Such a huge amount of idle money accounted for the annual digestion of domestic bonds amounting to one billion yen, and also for investments in Manchoukuo.

The above surplus money was invested as follows:

	National and Local bonds	Debentures and shares	Loans to Banking organs	A B	Total
1931 ..	370	339	114	453	824
1932 ..	948	316	463	147	801
1933 ..	2,344	290	249	41	1,385
1934 ..	1,276	699	193	506	1,782
1935 ..	959	626	264	893	1,852
1936 ..	1,024	794	457	1,251	2,275

The ratios of capital investments in Manchoukuo on one hand and in Japan Proper, and others on the other, are shown in the following returns compiled by the Manchurian Railway Company.

(In millions of yen)

	Newly raised bonds	Newly raised Co. debentures	Co. in Manchoukuo debentures	Shares paid up	Invested in Co. shares in Manchoukuo	The same shares excluding those of M. Ry. Co.
1933 ..	621	230	50	448	99	38
1934 ..	643	420	158	578	101	65
1935 ..	613	411	230	448	58	22
1936 ..	662	386	244	738	113	77
Total	2,539	1,447	682	2,213	371	202

It will be seen that a great expansion of capital investments since 1933 was due to the great flow of capital into Manchoukuo. Since July, 1937, when the Sino-Japanese hostilities broke out the Japanese money market has undergone a great change. Public bonds are being expanded owing to the fact that war expenditures are being met by these bonds, and at the same time company debentures and shares are also being remarkably increased for funds necessary for enlarging plants in order to expand production, thus causing an abrupt increase of negotiable bonds. The following returns shows an increase of Japanese bonds since the China Incident:

(In millions of yen)

	Increase in one year ending July 31, 1937	Increase in one year ending July 31, 1938
Local bonds ..	76.6	35.8
Debentures (bank debentures included) ..	123.2	616.6
Shares (paid up) ..	1,485.5	1,877.0
Total ..	1,685.3	2,519.4
National bonds ..	712.5	3,466.8
Grand Total ..	2,397.8	5,986.2

The following returns shows how the huge amount of the bonds has been digested by banking organs (the Central Bank excepted).

(In millions of yen)

	De- posits	Ad- vances	Negotia- ble bonds	Do- mestic bonds	Local bonds	Deben- tures	Shares	Others
July, 1936	18,669.2	10,601.1	11,962.8	6,160.6	1,698.0	2,967.2	704.8	43.1
July, 1937	20,269.2	11,990.7	12,211.9	6,380.1	1,705.2	2,888.3	790.1	448.1
July, 1938	23,340.0	13,234.8	14,605.6	8,496.8	1,711.6	3,015.3	895.0	486.9
Increase in one year ending July 1937	1,599.6	1,389.7	349.1	219.5	7.2	78.9	85.3	16.0
Increase in one year ending 1938	3,070.8	1,244.1	2,393.7	2,116.7	6.4	127.0	104.4	38.8

As the above returns show the deposits were increased by Y3,070,000,000 in a year from August 1937 to the end of July, 1938, of which Y2,120,000,000 was applied for the purchase of national bonds.

The comparison between the increased national bonds and the negotiable bonds owned by the banking organs will show that while the demand for short loans is very inactive, that for long term loans is very brisk. In a year ending July, 1938, national bonds had been increased by Y3,460,000,000 of which those valued at Y2,120,000,000 had been purchased by leading banking organs, those valued at Y320,000,000 by the Bank of Japan, and Y200,000,000 by Government's Special Accounts, while the remaining Y720,000,000 were purchased by others. But of Y620,000,000 which is the increased amount of company debentures only Y130,000,000 was purchased by leading banking organs.

As regards company shares their payments amounted to Y1,880,000,000 but the shares purchased by leading banking organs were increased by only Y100,000,000. The very slow digestion of company debentures, and shares of newly started companies is also due to the urgent demand for long term loans.

The government control of economics is gradually being intensified, and capital will be more and more invested in national bonds, in the funds for the expansion of production of munitions, export industry, etc. Thus it is expected that an important change will be made in the investment of capital in Manchoukuo.

Manchoukuo's industrial Five Year Plan was started in 1937, and its necessary expenditures are estimated at five billion yen of which 2.3 billion yen must be raised in Japan proper, but considering the situation of monetary market in Japan this is no easy task.

As was explained above, it is expected that about seventy per cent of invested capital will be repatriated to Japan by the trade balance between Japan and Manchoukuo, remittance of Japanese immigrants, deposits in banks in Japan by business companies in Manchoukuo, payment of interest for bonds, dividends on shares, etc. Moreover, the strict control of exchange in Manchoukuo will prevent great flight of capital abroad. Thus it may be surmised that despite great demand for war expenditure utmost efforts will be made for the intensification of capital investments in Manchoukuo.

Trade and Finance Relations of the U.S.A. and Manchoukuo

Mr. H. Arita, Japanese Foreign Minister, in his address delivered in the Diet on January 21, referred to the fact that Great Britain and America had been doing better trade with Manchoukuo than they did before that country became an Empire. Now we can prove the accuracy of his remarks on the basis of the actual results achieved during the past six years, which shows that U.S. is only second in Manchurian trade at present.

The following statistics published by the Department of Finance of Manchoukuo show the gradual increase of the trade between U.S. and Manchoukuo during the past seven years.

(In millions of Manchoukuo yuan)

Year	Imports from U.S.A.	Exports to U.S.A.	Exchange value of Yuan
1931 ..	18.3	8.9	20
1932 ..	20.1	5.1	21
1933 ..	29.0	7.6	25
1934 ..	35.2	6.2	33
1935 ..	24.9	15.6	29
1936 ..	23.7	16.4	29
1937 ..	57.5	18.7	29

Further statistics for January-April, 1938, shows that the U.S.A. supplied one-eighth of Manchoukuo's imports and thus held second place after Japan. Chief goods exported from the U.S.A. were iron, steel, wheat flour, sugar, copper, raw cotton, leaf tobacco, cigarettes and gunny bags.

This expansion of the Manchoukuo-U.S. trade has been achieved despite the most urgent exchange control laws exercised by Manchoukuo. When the Sino-Japanese hostilities are over, and Manchoukuo, whose money is linked to the yen, is able to repeal or at least revise the present exchange control laws, a greater expansion of trade can be expected, especially in the line of machinery in which Japan can hardly compete with the U.S.A. at present.

Of course, it is not only the trade with the U.S.A. that Manchoukuo is anxious to improve. She invites American investments, and also technological skill, but so far prospects of investment of American capital are not so bright as those of trade owing to the fact that bankers are reluctant to invest without representation, while both Manchoukuo and Japan need American financial assistance without any managerial representation.

By 1936 American investments in trade and industry in Manchoukuo amounted to 11,311,000 yuan. Now that perfect order is maintained in Manchoukuo, foreign capitalists can safely make investments and the State of Manchoukuo makes no discrimination in guaranteeing such investments, whether or not the investors belong to the countries whose governments withhold recognition of the Manchoukuo State. On this account American businessmen need not feel the least handicap on free transactions with Manchoukuo owing to the non-recognition policy of their government, just as was the case with U.S.S.R. before the U.S.A. recognized her. It will be seen that the door of Manchuria is not closed as some Americans think; on the contrary, the consolidation of Manchoukuo and the expansion of foreign trade and investments in the country go hand in hand. Especially Manchoukuo is the best market for steel products which are most urgently needed there. The only handicap which lies on the way for the development of trade relations between the two countries is the lack of long-term credit facilities which prevents big orders from Manchoukuo. Of course American financiers must finance such exports on their own risk since the American Government does not recognize the State of Manchoukuo, but they may rest assured of the financial stability of Manchoukuo. Capital investments in that country which is not recognized by the American Government are better safeguarded than investments in the Kuomintang Government in China which the U.S. recognizes.

The U.S. which has such a huge amount of surplus capital naturally seeks the best and safest market for its investment, and Manchoukuo is an ideal market for American investment, for that country is rapidly being expanded and needs foreign capital in every branch of industry. The mechanization of farming, development of mineral resources, modernization and expansion of transportation facilities and above all the industrialization of the state presuppose big purchases of machinery and equipment of various kinds. It is unfortunate that through the lack of credit facilities U.S. businessmen and financiers should not utilize such a promising market as Manchoukuo.

The State of Manchoukuo's five-year industrial plan which calls for a total outlay of Y4,800,000,000 for participation by third powers, either governmentally or privately. This offers the best opportunity for American investments.

It is to be hoped that the American-Manchoukuo trade and financial transactions will expand in volume, so that it may show that the "open door" of Manchoukuo is not closed.

Trade Relations of Manchoukuo and Italy

Political relations between Manchoukuo and Italy were established in November, 1937, when Italy accorded formal recognition to Manchoukuo. It was followed by the treaty of amity and navigation and the triple compensation trade agreement between Japan, Manchoukuo and Italy, which came into effect in September 1, 1938.

Trade follows political relations. Commercially the two Countries cannot be said hitherto to have been very closely related, for both being largely agricultural, each had little to supply the other, and, moreover, such articles of industrial products as Italy can supply are mostly in direct competition with Japanese goods. If let alone, therefore, there is no great possibility in trade relations between the two, but when Japan is inserted between them the case is different. Here lies the importance of the treble compensation trade agreement.

Manchoukuo has hitherto exported to Italy much more than she imports from her. The only exception was made in 1936, when Italy generally cut her imports drastically. Below is the table, showing the trade relations between the two countries since 1932.

TRADE BETWEEN MANCHOUKUO AND ITALY

(Unit 1,000 yuan)

Year	Export to Italy		Import from Italy		Balance*
	Amount	Percentage against total exports	Amount	Percentage against total imports	
1932	2,210	0.36	150	0.04	(+) 2,060
1933	1,855	0.41	459	0.09	(+) 1,396
1934	4,310	0.96	702	0.12	(+) 3,598
1935	3,859	0.92	1,357	0.22	(+) 2,502
1936	382	0.06	1,624	0.23	(-) 1,242
1937	2,645	—	1,064	—	(+) 1,589
1938	1,727	0.56	643	—	(+) 1,083

(up to August)

As may be seen from the above table, exports to Italy from Manchoukuo hardly amounted to one per cent of the total export of the country even in 1934 when the largest figure in recent years was recorded. The slump in 1936 was attributable to the general curtailment of imports by Italy in consequence of the Abyssinian expedition. The business improved the next year. In 1938, the total up to August was 1,727,000 yuan as against 2,416,000 yuan for the corresponding period of 1937, being only 0.56 per cent of the country's total export in the same period. In face of growing closer political relationship between the two countries, this market recession of trade may appear rather unaccountable, but it may probably be attributable to the world business depression.

On the import side steady improvement was sustained for five years, the figures rising from 150,000 yuan in 1932 to 1,624,000 in 1936. Even the latter figure, however, is only 0.23 per cent of the total import of the country for the year. The following year witnessed a retrogression and further recession was experienced last year. As stated before, most of those commodities Italy can supply Manchoukuo are of the same category as those in which Japan excels in as an exporter. As it is, there is little hope of any sensible improvement in Italo-Manchoukuoan trade relations unless some special measure is adopted to better the situation, and how far the treble trade agreement between Japan, Manchoukuo and Italy will be effective to alter the situation is still to be seen.

For various reasons, Manchoukuo is not in a position to supply Italy with mining products which Italy badly needs, and such exports as she is making consist of soya beans, ground nuts, hemp seeds and such other oil bearing seeds, while the imports vary according to the year. Thus in 1932, metal wares and machines constituted the principal articles of imports, and in the following year the largest imports were woolen goods, artificial silk and its products. It will be seen that the trade between the two countries has hitherto consisted in the exchange of farm products with the manufactured goods.

Whether there is any great possibility in the future of exports to Italy, we may refer to the following facts. In 1934 Italy imported 368,232 metric tons of oil-bearing seeds, consisting of ground nuts, soya beans, flax seeds, hemp seeds, etc., of which Manchoukuo's share was 40,890 metric tons, representing 11 per cent of the total. The following year witnessed a recession to 276,000 metric tons, and Manchoukuo's exports also decreased in volume to 35,987 metric tons, though in percentage they rose to 14 per cent. By reason of the Abyssinian expedition, foreign trade of Italy in 1936 fell to the lowest point in recent years, and the imports of oil-bearing seeds did not reach half the amount for 1934 at 186,634 metric tons. The imports from Manchoukuo in that year showed a negligible figure of only 2,184 tons or slightly over one per cent of the total.

In 1938 Manchoukuo's export of those seeds to Italy up to August totalled 15,000 tons, of which soya beans constituted the major part. In fact, Italy takes more soya beans from Manchoukuo than she takes from all other countries combined. As for other seeds such as hemp-seeds, flax-seeds and ground nuts, Manchoukuo's percentage is only negligible.

As for imports from Italy to Manchoukuo, artificial silk leads the list, and even this artificial silk is on the wane rather than otherwise, in accordance with the spectacular development of this industry in Japan. Other imports are quite insignificant, and there is little hope of any material improvement in the situation, for except for some special articles, most of those articles which Italy can supply are in direct competition with those which Japan can manufacture more cheaply than other countries.

Manchoukuo's export to Italy for the first eight months last year amounted to 1,726,000 yuan, which compares with 2,416,000 yuan of the same period of the preceding year. This recession may probably be due more to world depression of trade than to any other reason. On the other hand the imports up to August last year showed an increase of 280,000 yuan over the figure for the same period of 1937, despite the tariff revision in January and the foreign exchange control, which came into effect on August 1, 1938. The chief factor in this improvement was the material increase in the import of quick silver, machinery, building materials such as plaster of paris, and industrial manufactured goods. It is noteworthy that the products of heavy industry should now be taking place of those of light industry that Italy has hitherto been sending to Manchoukuo. It is still too early to predict the result of treble trade agreement between Japan, Manchoukuo and Italy, which came into effect on September 1, 1938.

The Burma-Yunnan Road and Railway

By Professor C. A. MIDDLETON SMITH, M.Sc., M.I.Mech.E., in *The Engineer*

AT the present time about 170,000 Chinese are at work on road construction and in making detailed surveys for rail communication in the large interior province of Yunnan, in Western China. A Chinese engineer, engaged on survey work connected with the railway from the city of Yunnanfu,* in the interior of China, to the Burma frontier, recently travelled several hundreds of miles to Hongkong in order to obtain technical details concerning the Burma railways. He described some of his recent work to the writer, who as a result became greatly interested in these two astonishing engineering projects now being worked out, viz., a railway and the new motor roads that will connect, by mechanized vehicles, towns in the far distant interior of China with Burma and the port of Rangoon.

This construction is being carried on in a part of the world practically unknown to Europeans, except a few bold and adventurous travellers and those British officials who were sent out at various times to survey the old trade routes with a view to suggesting improvements. The new mechanized trade routes between Burma and China will traverse "the high Eaves of Asia." The introduction of wheeled traffic on these trade routes will have very important economic and probably unexpected political results. The British Empire will certainly benefit when the work is completed.

This railway is of especial interest to British engineers for at least two reasons. It has been strongly advocated for many years by the British in order to increase the trade between Burma and China. When the line is completed it will be possible to transport machinery into the western provinces to places which have hitherto been, for all practicable purposes, inaccessible for heavy loads. Engineers will, however, be chiefly interested in the tremendous natural obstacles in the path of those building a railway or a road, from China into Burma; they are of a colossal magnitude, far greater than those met with in the route suggested for mechanized vehicles in any other part of the world. The construction of the Canadian Pacific Railway over the Rocky Mountains was a much easier problem. The challenge presented by Nature to the Chinese engineers, now engaged upon a task that might seem to be almost quixotic, must make the struggle upon which they are engaged one of absorbing interest to those who, because of their technical training, are able to appreciate fully the ingenuity, skill, and perseverance that are demanded for the successful completion of the work.

The New Outlook in China

As far back as 1865 an English missionary who had spent many years in China realized the imperative need in the country for improving roads, building railways, and replacing man power by mechanization. "The choice for China," he then wrote, "lies between steam and anarchy." To the delay in the introduction of steam power can be attributed the following fifty years of anarchy in many parts of China. It is impossible to estimate the amount of human suffering and the loss of lives because of the opposition for decades of officials (with minds saturated in the static philosophy of the Chinese classics) to the many suggestions

made by foreigners for the use of steam power in China. Fortunately, there has recently been a complete change in outlook in Chinese official circles. There is now a demand for mechanization from all sections of the educated classes.

Let us consider the reasons for the active work now being done to increase communications in the interior of China. Chungking, in one of the interior western provinces, Szechuen, is now the headquarters of the Chinese Government. That province has some 71 million inhabitants; it is very fertile and is rich in minerals. It borders Tibet; adjacent to it is the province of Yunnan, which borders Burma. The objective of the Chinese Government is to provide, as quickly as possible, facilities for wheeled traffic between the important city of Yunnanfu, and the port of Rangoon. From Yunnanfu motor vehicles connect up with Szechuen, and later the railway from Burma will be extended to that province. It is hoped to increase the deliveries of munitions and stores for the Chinese armies in the interior provinces by using the port of Rangoon, the new roads and—later on—the railway to Yunnanfu and Szechuen.

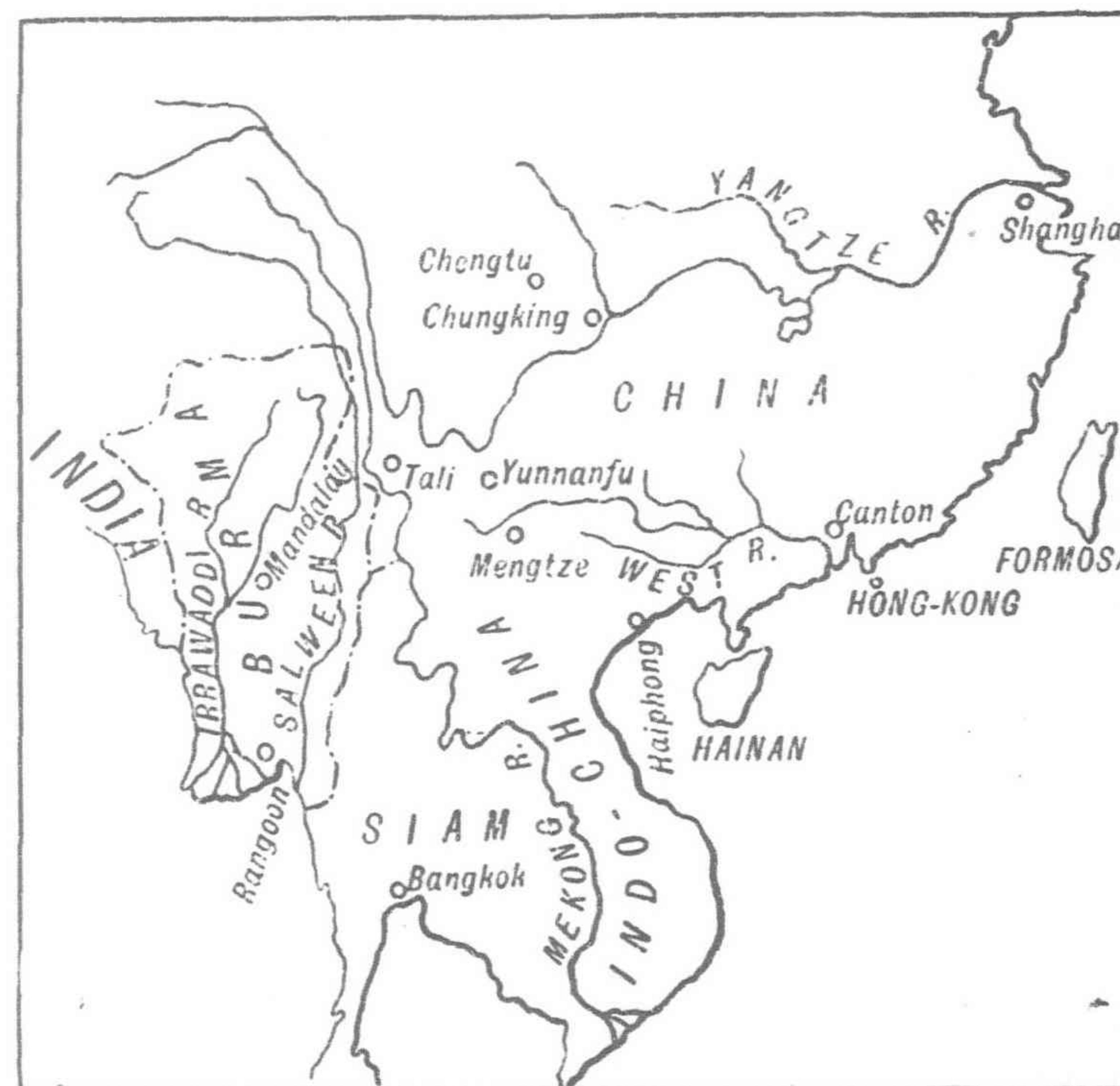
The New Roads in China

It is true that "necessity is the mother of invention," but it is the instinct for self-preservation that has made the Chinese push ahead with these new lines of communication to the sea. Tremendous efforts to increase communications had been made just before and since the Japanese invasion. The total mileage of new road construction in China in the last five years is almost incredible. Great progress has been made in connecting towns in the south-western and in the south-eastern provinces. A reliable European agent recently informed the writer that since the Japanese invasion—about fourteen months ago—more than 150,000 motor vehicles (mostly lorries) have been landed in Hongkong destined for the interior of China. They were nearly all of American (many Canadian) and German make. Unfortunately, the network of waterways in the Canton delta involves the use of numerous

ferries, although in many places new bridges have been built. Many of the vehicles were shipped from Hongkong to the French port of Kwangchow, in Kwangtung province, to the south of Hongkong. From Kwangchow they ran on the new roads to Chengtu, in Szechuen, a distance of 1,000 miles. From Haiphong, in French Indo-China, motor vehicles run up to Kwangtung province, in South-East China, a distance of 1,000 miles. In a few weeks it will be possible to motor from Hongkong to Yunnanfu, in the interior of China, and thence to Burma. In 1937 through traffic by motor vehicles was established between Nanking, on the Yangtze, and Yunnanfu.

Although in March last no major bridge had been erected on the Yunnan and Burma road, remarkable work has been done by the peasants building the road. They have no machinery—

*This center of Provincial Government is now officially known as Kunming. The Chinese have a disconcerting practice of changing the names of towns when Governments change. Yunnanfu is the name that is commonly used in English books. "Fu" means center of government, so that "Yunnanfu" shows that the town is the center of government for the province of Yunnan.



China and neighboring countries

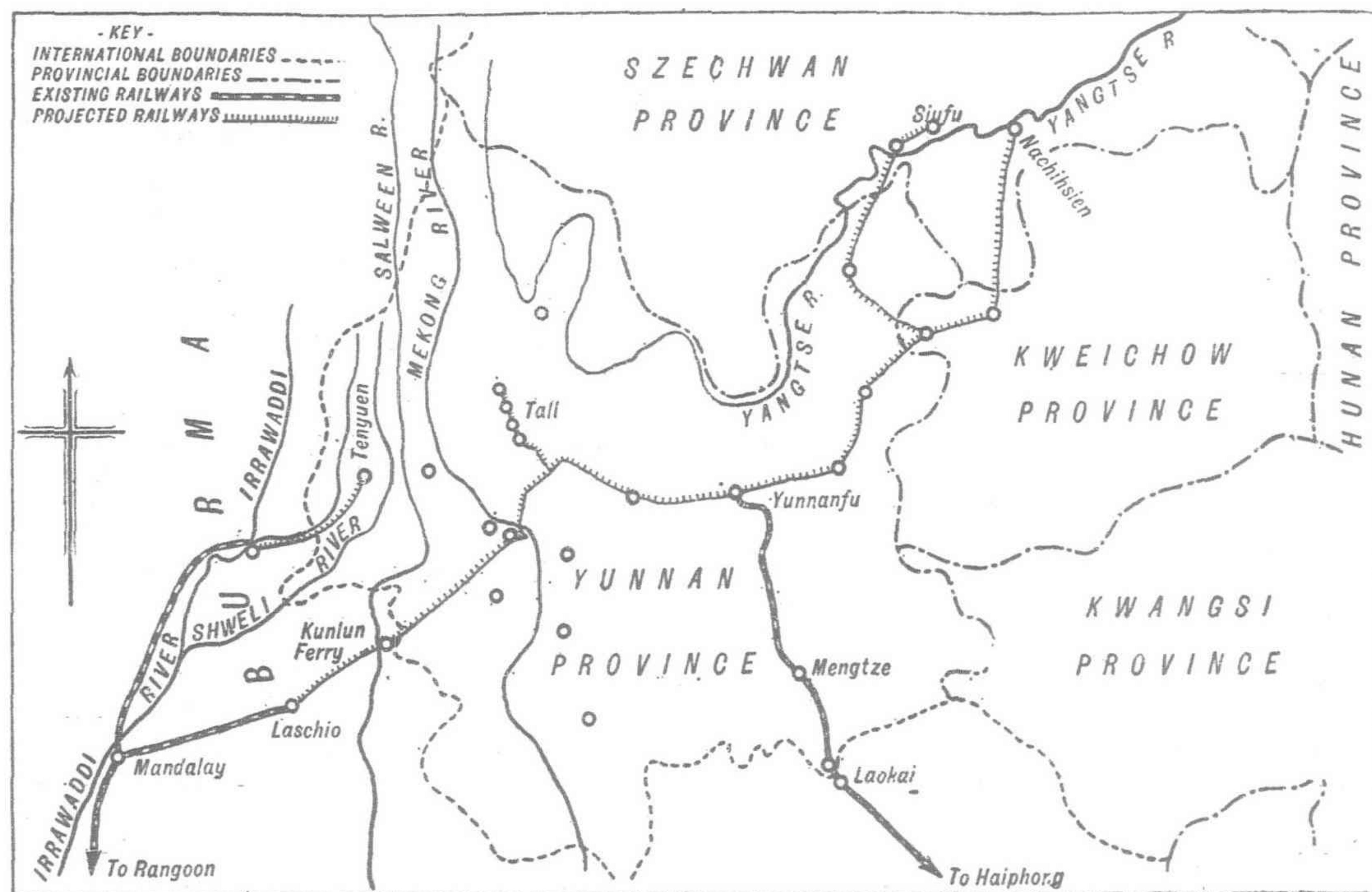
"their nearest approach to a machine is a cylindrical boulder, which, with the help of a water buffalo, does duty as a steam roller." In other parts of China large numbers of peasants have been building roads with almost primitive tools, but in many cases supervised by competent engineers.

The invasion of China by the Japanese has accomplished what the expert advice of foreign engineers, and frequent diplomatic representations by the British, over a period of about seventy years had failed to do. It is probably difficult for the average reader to realize that until twenty years ago there were no roads at all over Central and South China. There were thousands of miles of single-file paths, many of them paved, along which countless coolies trudged, one behind the other, carrying heavy loads for long distances. Officials and wealthy merchants were—and in some places are still—carried in sedan chairs. In 1912, when the writer visited the largest city in South China for the first time, he was astounded to find the paved and crooked streets only about 10-ft. wide from house to house. "Canton is a city of a million people, and a city without a wheel," he wrote. To-day motor buses, cars and traffic lights are to be seen in all parts of the city. There never has been such a rapid extension of roads for wheeled traffic in any country as has taken place in China during the past twenty years. To-day commercial planes fly from Hongkong to Hankow and Ninghsia (1,591 miles) on a bi-weekly service. There is also the round trip, Hanoi, Yunnanfu, Chengtu, Sian, and Hongkong, 2,200 miles. Planes fly directly from Hongkong to Chungking in six hours.

British officials in Burma and China, traders, and even missionaries constantly tried to persuade the Chinese to improve the very primitive and precarious trade routes between the two countries. Long caravans of men and animals moved slowly over the tracks, except in the rainy season (June to October), when the rainfall reaches the astonishing figure of 130-in. For at least 2,000 years there has been a constant exchange of commodities carried along these routes. The goods were, and still are, borne on the backs of pack animals (usually mules) over the steep mountain passes, and the precipitous descents (often a rapid fall of about 4,000-ft.) from the mountain passes down to the narrow swinging suspension bridges that span the mighty gorges of numerous swiftly running rivers. The British, a far back as 1869, realized that a railway would increase the volume of foreign trade with China, and that, in consequence, the port of Rangoon would greatly benefit. Since that date they have constantly urged the construction of this line.

The Railway from Rangoon to Laschio

"A Special Correspondent" of *The Times* wrote in 1898: "It is now many years since I first advocated the railway connection with Burma and Southern Western China, first of all, with a view to opening Yunnan and Szechuen, and, secondly, to effect a junction between those two great waterways, the Yangtze and Irawadi. It appeared to me that the connection of the navigation limit of the Yangtze with our most eastern Indian province was a matter of cardinal importance." The railway from Rangoon to Mandalay had been extended in Burma at about the end of the nineteenth century (a) to Bhamo, on the Irawadi River, and (b) to Laschio, a town about 140 miles from the Yunnan border. Bhamo is about 120 miles north of Laschio and about 50 miles distant from the Yunnan border. River steamers from Rangoon can reach Bhamo, but Laschio's nearest contact with river traffic is Mandalay. Thus there are now two railheads in Burma, not far from the Chinese frontier. It is probable that in due course both sections of the line from Rangoon that branches at Mandalay, will enter Yunnan province. But the line from Laschio is the one that will be extended to the Burma-China frontier in the near future.



Yunnan and surrounding provinces

At Kunlun Ferry, the frontier station, it will link up with the section in China which is now being surveyed. The proposed route of the railway from Laschio in Burma to Siufu in the province of Szechuan is about 1,000 miles, thus connecting two great waterways, the Irawadi and the Yangtze.

Former Proposals

The projected railway from Bhamo, across the border, to a town named Tenyueh, in Yunnan, will probably be built at some future date, but the country to be crossed is even more difficult than the Laschio and Yunnanfu route, and it is unlikely that the line will ever extend far into China. It may go as far as Tali in Yunnan province, but it will probably terminate at Tenyueh. Several important rivers traverse Yunnan. Any railway or road construction involves spanning the valleys of large rivers and numerous smaller feeders. Two large rivers, the Salwen and Mekong, run respectively into the Bay of Bengal and the China Sea. The important tributaries of the Irawadi, viz., the Taiping and Shweli, run through the western part of Yunnan. There are, in addition to these large rivers, innumerable mountain torrents. Writing in *The Times* from Hankow (May 18, 1938) under the caption "The Burma Road to China," a "Special Correspondent" (probably Peter Fleming) uses these words: "The problem facing a traveller who wishes to proceed from Tenyueh to Yunnanfu is much the same as that which is attacked by an ant crawling laterally across a sheet of corrugated iron. The route lies along the eaves of High Asia."

A party sent by the Indian Government completely surveyed the Bhamo, Tenyueh, and Tali route in 1905-07. The conclusions drawn at the time were (a) that a light railway could be built from Bhamo to Tenyueh, 121 miles, at an approximate cost of £1,100,000; (b) that the line would probably pay after a few years; (c) that the extension of the line from Tenyueh to Tali, 159 miles, would involve great, but not insuperable difficulties, and would cost about £3,100,000. It was suggested that this extension would probably not be a commercial success. The cost of maintenance of the extension from Tenyueh to Tali, which must cross the torrential rivers Shweli, Salwen, and Mekong, would be a serious matter, as landslides are frequent in those regions. From Tenyueh to Yunnanfu is 379 miles of very difficult country which is unlikely to be crossed by a railway.

The line now being planned in detail will run from Laschio to Yunnanfu. This railway must cross the Salwen and Mekong rivers, but it does avoid some difficult feeders of the Irawadi. Although this line, together with an extension into the province of Szechuan, was projected many years ago, no detailed surveys seem to have been made. It is worth noting that the British

authorities greatly improved the Burma section of the Bhamo-Tenyueh caravan trade route; in 1904 the Burma P.W.D. constructed 12 miles of road in Chinese territory at a contract price of 64,000 rupees, paid by the Chinese. Recent newspaper reports state that at long last the disputed boundary line between Burma and China has been agreed upon and that the British in Burma are actively engaged on road construction into Yunnan province. Motor omnibuses have been running from Yunnanfu to Tali for about six months on the new road.

Lord Ronaldshay wrote, some years ago ("A Wandering Student in the Far East"), concerning the Burma-China frontier, that "as regards railway construction, even per mile the work would be more difficult than the Rocky Mountain section of the Canadian Pacific Railway." The expert opinion of Baber concerning the Burma-Yunnan Railway project, written 1879, is worth nothing. It is as follows:—"I do not say that it would be absolutely impossible to construct a railway. A high authority has informed me that if shareholders will provide the money they will always find an engineer to spend it. By piercing half-a-dozen Mount Cenis tunnels and erecting a few Menai bridges the road from Burma to Yunnanfu could doubtless be much improved." But the work has now commenced in real earnest. At the present time Chinese engineers are making two surveys over a distance of about 500 miles from Yunnanfu to the Burma border. They are at work on alternative routes. One route follows a river valley for about 300 miles; the other follows the road. The route from a town named Yunshien, in China, to the Burma border has been decided upon; detailed surveys are now being made on that route by several parties of Chinese engineers. Some 50 miles has already been mapped out in detail and construction will commence in a few weeks' time.

The French Line to Yunnan

About forty years ago it was frequently said that "the politics in China are railway politics." The British were the pioneers of railway construction in that country and they have invested large sums of money in China's railways. Under the Manchu rule, which ended in 1911, the railways showed good returns, but the chaotic political conditions in large areas of China since that date made it impossible to maintain efficiency on the railways. The early experience of the heavy and profitable traffic on the railways caused the financiers and statesmen of Britain, France, Belgium, America, and Germany to become convinced of the possibilities of good investments in new railways in other parts of China. There was also the urge to find a market for the equipment that could be supplied from the industrial countries and used on the railways in China. It is of interest to note that, although the British had constantly urged linking up Mandalay (and Rangoon) in Burma with the interior provinces of Yunnan and Szechuen, yet it was the French who first succeeded in providing a rail connection between Yunnanfu and the sea. This line is mentioned because a few details concerning its construction, etc., will enable the reader to realize some of the difficulties of building and maintaining a railway in the tropical and mountainous districts of South-East Asia. The French line was begun in 1901 and opened in 1910; it runs from Haiphong through Tonking and Yunnan, and it is a remarkable

triumph of engineering skill. The total length is 529 miles, viz., 241 miles from Haiphong in French territory and 288 miles in the Chinese province of Yunnan. The expense of upkeep of this line has been very great, on account of the turbulent rivers, heavy rains and, in general, the physical nature of the districts through which it runs. But the line has paid good dividends since its inception.

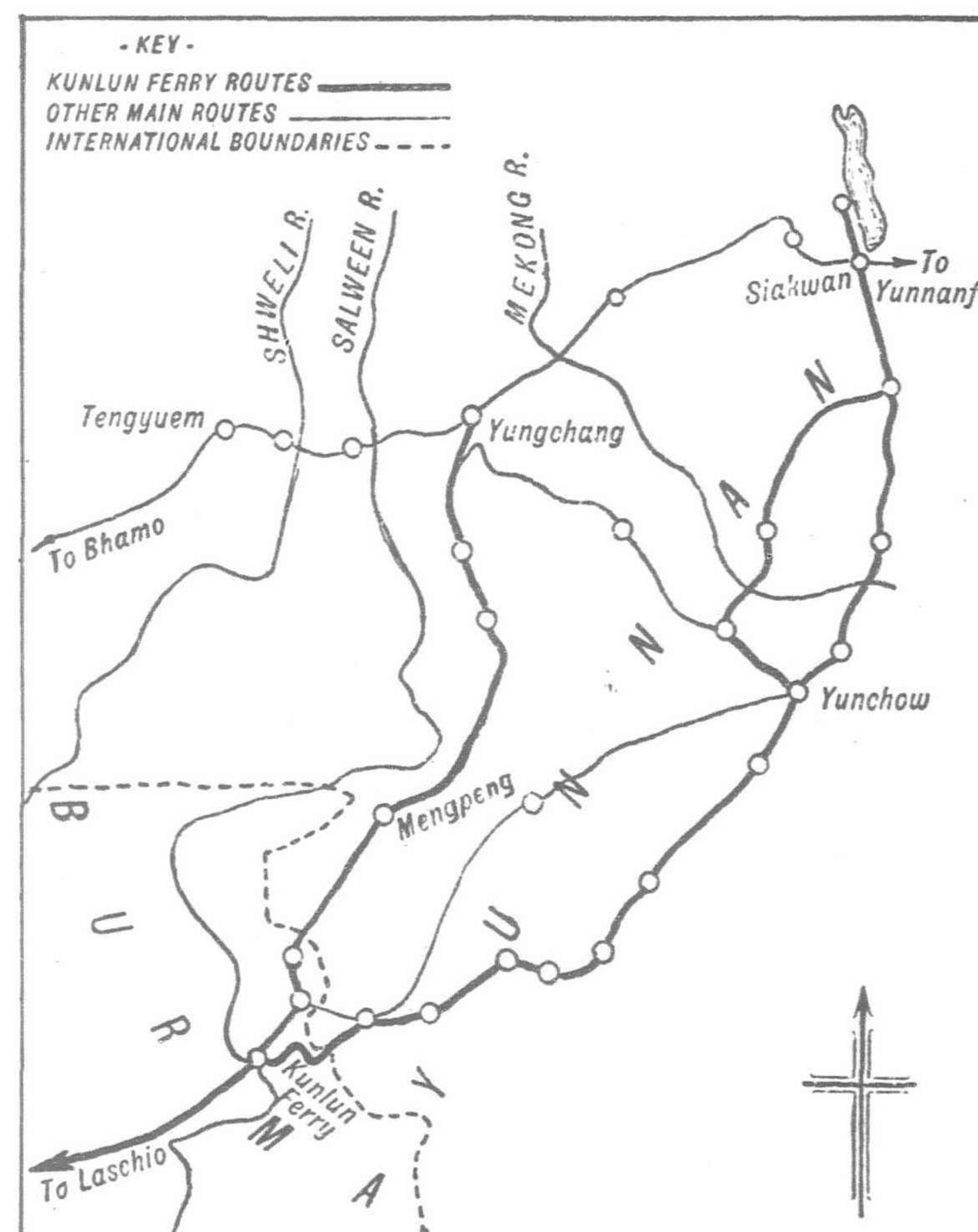
Passenger trains take three days on the total journey. When the line was first projected there were heated discussions about the route. Any railway link between Haiphong and Yunnanfu presented very great engineering difficulties, involving heavy outlays for cuttings, tunnels, and bridges. The engineers finally decided to abandon the old trade route that passed through the principal cities and more populated valleys, and decided—solely on the score of capital expenditure—to build through less difficult country although it had practically no population and no trade. "The section built through the dreaded Nanti Valley," wrote A. Wilson in a Trade Report (1905), "has levied a heavy toll upon those who have dared to open up its primeval jungle and gullies."

Along the deep gorge of the river, mountains rise sheer on either side to heights of 3,000-ft. and 4,000-ft. above the water. So narrow and confined is the valley that the engineers, in many places, had to cut the railway track in the mountain side. Again, they had to cope with a fall of several thousand feet from the plateau of Mengtze to Lokai (a French station in tropical jungle on the Chinese frontier), while projecting spurs of the rugged mountains were tunnelled at great expense. The death-rate during construction was appalling. In one year out of a total of 5,000 men, engaged on one section of the work, 70 per cent lost their lives. Improvements were made, but the deadly malaria, other tropical diseases, snake bites, and attacks by wild animals, made it very difficult to obtain labor. The Chinese engineers in Yunnan will meet similar and even greater obstacles. They have at their disposal an almost inexhaustible supply of man power, but they will not have mechanical aids available to engineers in other countries.

The Haiphong-Yunnan Route

It is difficult to obtain reliable data about engineering works in the Far East, but a general account of the main features of this French line will, it is hoped, be of interest. The following details were supplied to the writer by an English scientist who recently made the journey from Haiphong to Yunnanfu. The line is of 1 m. gauge, with steel sleepers throughout, laid on the usual rubble ballast, and with heavy Vignoles rails. There are no chairs; the rails are attached to the sleepers by bolts and flange piece that allows for lateral movement during expansion. Owing to the great changes of temperature, especially in the mountainous districts, the expansion joints are large, as much as 1-in. in a 24-ft. rail, and yet trouble due to deformation of the track, owing to excessive expansion, is not uncommon. The track is expensive in upkeep, but it provides a large margin of safety and very smooth travel.

The gradients on the line are very severe. In the first 400 kiloms. the line rises only about 100 m., but in the next 120 kiloms. it ascends no less than 1,700 m., giving an average gradient of 1.4 per cent. Actually, however, the gradient varies considerably, and often exceeds three per cent for several kilometers. A tank



Kunlun ferry and other routes into Yunnan

engine is usually added, if the train is heavy. A descent is then made from Mengtze summit to about 1,600 m., and for the next 200 kiloms. the line proceeds over a slightly rising plain. Then another steep ascent is made to the highest point (2,170 m.—more than 7,000-ft.), followed by an equally steep descent to a third plain, and a final slight ascent to the plain of Yunnanfu, about 6,000-ft. (1,969 m.) above sea level.

At 398 kiloms. the gradient suddenly steepens to 1 in 80, and the train, conveying my friend, slowed down to about 15 miles an hour. Non-expansive working of the h.p. cylinders increased the blast from the engine so that it belched much of the fuel from the funnel, and a heavy rain of slag particles settled everywhere. The surrounding jungle showed evidence that fires from this source were not uncommon. At 422 kiloms., the track again crosses the main river by a short girder bridge and enters the tributary valley of the Nam Ti. Here the scenery is inconceivably grand. The valley of the Nam Ti is fully 3,000-ft. deep, and not more than three miles wide at the summit, where on the opposite side and about 2,000-ft. above the elevation of the lower track (of elevation 1,000-ft. or so), the line proceed down the valley. At 445 kiloms. the track passes over steel trestle bridge, fully 200-ft. high and 400-ft. long, with a right-angle curve in its length and a tunnel at the opposite side. More than 100 tunnels, varying from a few yards to half mile in length, are encountered. At 468 kiloms. the line reaches the point where the train crosses over the River Nam Ti by a most remarkable engineering feat. The gorge is here a vertical cut, about 1,000-ft. deep, the walls being 400-ft. apart and perfectly sheer. The bridge consists of a braced girder supported by two unsymmetrical trussed girders which meet in an inverted V. The line is connected to the bridge by two tunnels on 90 deg. curves. The thrill of emerging on to the bridge, suspended high above the foaming water and overhung by profound vertical rock walls, is unforgettable. The train then proceeds in the reverse direction along the valley, rising continually and finally forces its way over the divide at Mong Tze summit, more than 3,000-ft. high. From this point there is a short, but steep, descent (gradient 1 in 40) to the plain of Ta Ko, a great expanse of rich soil, entirely surrounded by mountains rising to 8,000-ft. They are not snow covered, for the precipitation is not great. Proceeding at 570 kiloms. the station of Ami Chow (height 1,630 m.) is reached, after about twelve hours' travelling, and the second night is spent here. Only 190 kiloms. are covered in the day, and only about 80 kiloms. as the crow flies, but more than 4,000-ft. of total ascent and 1,000-ft. of descent are included.

At many points guard tunnels of reinforced concrete have been erected to deflect the falling rocks, and in one case a stream has been diverted over the valley of the Upper Ta Ko. This is now reached by a gentle descent, and at 720 kiloms. another severe ascent commences, which takes the line over a mountain range nearly 8,000-ft. high (summit 2,170 m.). This is a very exposed region, where the temperature shows immense diurnal variations, sinking below zero at night. The train then makes an abrupt descent (1 in 40) to the plateau of Yunnanfu, after passing over 107 viaducts and bridges of not less than 65-ft. span, and through some 172 tunnels whose combined length represents more than 15 miles.

Road Communications in South-Eastern Asia

At first this French railway profited by the war in China. At the beginning of the year (1938), for the first time in its history, all of the rolling stock was in use. Suddenly, the French, in deference to the requests of the Japanese, ceased to allow munitions to be transported on this line into China. It is worth noting, however, that the French have built splendid roads in Indo-China, and the Chinese rushed through with road construction in their south-eastern provinces. Consequently, there has been active transport by lorries from Haiphong into China. Mention should be made of the extensive engineering work carried out by the French in Indo-China. One scheme of land reclamation, when completed, enabled a population of a million people to earn a livelihood on an area that had no occupants before the work was commenced.

The only deep-sea port at present available for munitions to be unloaded on the China Coast is Hongkong, and the Kowloon-Hankow Railway has been the main artery for the transport of goods into the interior. It has been continuously, but on the whole, ineffectively bombed from the air, a pastime that must have been very expensive for the invaders when compared with the cost of

repairs of the damage done to the line. Large numbers of lorries have covered a zig-zag route of about 1,630 miles over new roads between Hongkong and Yunnanfu.

About half-way along the south-east coast that lies between Hongkong and Haiphong is the small port of Kwangchou Wan, which has suddenly grown in importance because motor vehicles can now carry goods along the new roads in China from that port right up to the interior city of Chengtu in Szechuan province, a journey taking six days; as usual, in China, there are many ferries on the route and bridges are badly needed.

The Old China-Burma Trade Routes

One of the greatest British railway engineers, Sir MacDonald Stephenson, visited China (1863) some twenty years after he had projected the first railway in India. He was an expert prominently connected with the development of the Indian railway system. He sketched out a comprehensive scheme for China, only a portion of which has as yet been completed. But any engineer who studies his rough plans must admire his great ability, as revealed by the routes in China which he suggested. He advocated a railway from Burma, through Yunnan, to Szechuan. His schemes proved to be premature. But this reply to his critics was worthy of the man and his profession. He said: "If a measure is sound and assuredly beneficial, as in this case is admitted on all hands, it can never be premature to take the initiative step, advancing only from time to time as the opportunity may be afforded." There can be no doubt that the neglect to implement more rapidly the plans of this British railway engineer was a tragedy which has resulted in terrible suffering in China.

The Crowded Vehicles in China

The French railway reached Yunnan many years before the Chinese link with the Burma and Yunnan line was commenced. Why did these two European nations fight (with diplomatic weapons) to push a railway from ports under their control into Yunnan? It was because of the very great trade passing through that province, and the reputed enormous mineral wealth of Yunnan and Szechuan. There can be no doubt that when the Burma and Yunnan Railway is built, there will be a great deal of traffic on the line. The Chinese are not only a nation of traders. They are great travellers, for their Confucian social system imposes upon them obligations to visit relatives and to return at not infrequent intervals to the ancestral graves. Chinese coffins from Java, Malaya, and even more remote places are sent back to the villages and towns of China, so that the dead may rest alongside the graves of ancestors. Wherever there are railway or public motor vehicles in China, crowds of passengers swarm into them. The volume of traffic seems to be restricted only by the number of wheeled vehicles available. It is the story of the growth of traffic due to mechanized vehicles in London, but in a land of 450 million people. There can be no doubt of the large numbers of passengers and the great volume of freight that will be carried on the Laschio and Yunnanfu Railway. There are millions of Chinese in Burma, where their industry and skill have enabled them to be much more successful in the acquisition of wealth than the easy-going natives of that country.

As far back as 1795 the Honorable East India Company's envoy to Ava commented upon the extensive trade overland between Burma and China. Those old caravan routes are triumphs of the perseverance, industry, and ingenuity of those who have maintained them. They pass across the country that the projected motor roads and railways must cross. Marco Polo, two famous correspondents of *The Times* (Dr. Morrison and Peter Fleming), and even intrepid English women, have climbed up steep tracks from rivers to mountain passes, often an ascent of 4,000-ft., and struggled down precipitous paths in the gorges to cross over swiftly running and wide rivers that are spanned only by swinging suspension bridges made of cables built up with plaited bamboo. For at least 2,000 years long caravans, mules heavily loaded with silks, papers, gold leaf, etc., from Burma passed over tracks described by an English traveller as "a miracle of inefficiency." An extract from his notes gives some idea of the terrible obstacles presented by Nature to the Chinese engineers who are struggling to make it possible to run mechanically propelled wheeled vehicles from Burma into China.

This English official, resident in Yunnan province for years, wrote in a trade report (1902-11) as follows:—"The natural configuration of the country, consisting as it does of range after range of mountains, interspersed with broad and unnavigable rivers, plains and gullies of unstable formation, precipices and jungles, torrents and morasses, and that in a climate where the rains each summer last almost unremittingly for four months on end, would render road construction of great difficulty, even if the skill and knowledge of modern science were available. When, however, the making of roads over such a country was consummated, presumably during the Age of the Five Rulers, and the mending of them is only undertaken by the private organization of the patient but penurious sufferers who are condemned to use them habitually, one can understand the miracle of inefficiency to which they are now reduced, and can sympathize with the explosion of literary profanity that invariably characterizes any attempt which the modern European traveller may make to deal with the subject in print."

Wonderful Bridges

From about the middle of June to the middle of September there are heavy rainfalls, practically all of it falling in the wet season. In addition to this adverse climate, there is the scourge of a very malignant type of malaria, so that on the Bhamo and Tenyueh route it has been almost impossible for through traffic to continue in the wet season. There is no doubt that there will be heavy casualties from malaria in the valleys during the construction of the road and railway from Laschio to Yunnanfu.

The construction of a road for motor vehicles over country of that nature must be difficult indeed, because on any of the routes there are many flimsy bridges and the tracks down the gorges to the rivers consist of "dilapidated flights of steps." Modern motor vehicles can, it is true, negotiate steep gradients—in Hongkong my car runs daily up a slope of 1 in 8. But railway trains are different. My friend, the Chinese engineer from Yunnan told me that, as in the case of the Burma railways, a meter gauge will be used. No gradient will exceed three per cent. The minimum curve is planned to be about 100 m. radius. Difficulties of making curves, tunnels, bridges, etc., can be imagined.

A note of human interest may be permitted, for there is much that is tragic in the life of Chinese engineers with good professional qualifications, working or out of employment, in China to-day. This engineer from Yunnan seemed to be worn out and worried by the difficulties caused by poor equipment and a lack of information. "Since the war," he said, "we have had no rest; always we receive many complaints that the work is proceeding slowly when we are continuously working hard for long hours. Our pay has been cut to below half what it was." He is an engineer, with the degree of a first-class American University, and with several years of practical experience. He is receiving the equivalent of less than £3 a week. "I cannot support my family on it," he added in a despondent tone. That is only one of my several pathetic interviews with "returned students" with good technical qualifications. Many of the older men have lost every source of revenue. The lack of organization in Government circles has made it impossible in many cases to utilize their skill. They remain in Hongkong or other places, waiting, with amazing patience, for the days of reconstruction.

Bamboo Rope Suspension Bridges

There is one section of railway work in China, viz., bridge building, that uses up much material—steel—a material that must be imported. China has been called "the land of rivers," and there are many thousands of bridges, many of great age and beauty, scattered over the vast area of the country. In the science of bridge building the Chinese have shown great ingenuity, but until recent years they used only primitive materials.

Marco Polo commented upon the remarkable bamboo rope suspension bridges frequently seen on the Burma and China route. He describes the ropes in these words: "They have canes of the length of fifteen paces, which they split, in their whole length, into very thin pieces, and these, by twisting them together, they form into ropes three hundred paces long. So skilfully are they manufactured that they are equal in length to ropes made of hemp." The ropes generally have a diameter of 2-in., and can carry a load of four tons. Bamboo strips from the inner part of the stem form a kernel in the middle of the rope and in a testing machine they

fail first. The material of the plaiting—about half the cross section—is very strong, breaking at a stress of 26,000 lb. per square inch.

Single-rope bridges carry a basket attached to a wooden ring, which slides on the rope. Two persons sit in the basket, which is pulled across by a lighter rope. In some places there are two ropes. Each slopes down to the opposite bank, and the traveller is tied to a ring or a wooden barrel and gravity carries him down the inclined rope. He usually is supplied with water to pour on the rope in front of the yoke of his primitive carriage, so as to prevent the bamboo catching fire on account of friction. A flight of steps on the opposite bank enables the traveller to climb up to the mountain track. Incredibly as it may seem, mules are passed over these single bamboo cable suspension bridges.

It is obvious that railways and road vehicles must be provided with more modern structures. It is believed that the general outline of the nature of the country between Yunnanfu and Laschio will have convinced the reader of the very great quantity of steel that must be imported for the construction of bridges on that route.

It might be thought probable that, as Rangoon is much nearer to Europe than Hongkong and Haiphong, some of the foreign trade with the interior of China that is now carried on through those ports will be deflected to Rangoon. It is, however, certain that under the great impetus towards mechanization in China that has been caused by the entire change in outlook of the leaders of the nation, there will be an immense increase in trade between China and the industrial countries. During my residence of twenty-six years in Hongkong the urban population has practically doubled, and is now about 800,000 people. There are so many industries in China that will benefit from mechanization and modern methods of communication that engineering works must increase the wealth of the country and also the volume of foreign trade. All that is required is a period of peace. The astonishing industry, perseverance and ingenuity of the Chinese under peaceful conditions will enable them to carry out engineering schemes of great importance that will be value not only to themselves, but to the more highly organized industrial nations. "Hope," says R. L. Stevenson, "deserts us at no period of our existence." The age-long experience of the Chinese people, so often victims of floods, famine, and warfare, seems to have given to them a stoicism that enables them to say, as they realize the terrible devastation caused by the Japanese invasion, "This, too, will pass." It will, however, have burned deeply into the minds of the intellectuals the real cause of the extent of their sufferings, viz., the lack of rapid communications and mechanization in their own land. When peace returns there will be no need for foreigners to urge applied science developments in China. It would be a daring mind that would attempt to forecast the political changes that will emerge from the present conflict. It is, however, safe to predict that the economic changes, especially in the interior provinces, will be profound, owing to the activities of engineers.

Air Transport 5,000 Years Hence

Air experts are intrigued to hear that in connection with the New York World's Fair a time-capsule has been buried which is to remain unopened for 5,000 years, and which contains on a special micro-film—among other things—details of Imperial Airways services in operation at the present time.

What will people of the future think of air navigation as carried on in 1938? And what sort of progress will have been achieved in another 5,000 years? It seems reasonable to assume that stratosphere flying will have been developed to a stage at which speeds become possible vastly exceeding anything attainable to-day. And perhaps engine-plants may, by then, be deriving their power from some form of atomic energy.

To-day, peering ahead, we seem rather in the position of those pioneer pilots who, discussing future progress at the world's first air meeting at Rheims in 1909—just after Curtiss had won the speed contest at 47 m.p.h.—held the view that about 100 m.p.h. might probably be the speed-limit even of racing-planes. And yet at the present time, less than thirty years later—and apart from the wonderful performances achieved by special record-breaking craft—purely commercial-type air-liners, such as the Imperial flying-boats, or the great "Ensign" land-plane, when carrying their full loads, reach a speed of 200 m.p.h.—twice that envisaged by those pioneers of 1909.

“House of Magic”

AT the Schenectady, N.Y., plant of the General Electric Company of New York there stand two massive oblongs of masonry connected by a bridge, and within their walls is housed one of the world's outposts of scientific research. For more than three decades a keen-eyed, quick-moving, serenely energetic man has made this spot his base of operations in adventurous expeditions into the realm of the unknown, either personally conducted or personally supervised, seeking new knowledge for the benefit of mankind. When this man, Dr. W. R. Whitney, began his activities at Schenectady he was thirty-two; to-day he is seventy, has retired from active duty as director but is still busy almost daily at the laboratory. He still holds the title of vice-president of the Company in charge of research.

Nothing could be simpler than the surroundings amid which this great laboratory had its beginning in 1900. It started in a barn, but within somewhat more than a decade it was occupying most of a modern seven-story brick structure expressly erected for its accommodation. Less than fifteen years later an annex was required, and another big building, this time six stories, went up. At that time the laboratory had probed so deeply and so effectively into vacuous phenomena that the new edifice was alluded to as “the building that came out of a vacuum.”

In 1900 all this was unforeseen, unsuspected and unimagined. Whitney, young instructor in chemistry at Massachusetts Institute of Technology, did not even feel sure that he wanted to undertake the task of establishing a research laboratory for the General Electric Company of New York. He was fearful that it would mean shutting himself into a restricted groove in the great American industrial machine. Professor Elihu Thomson, one of the electrical scientists who founded General Electric, gave him a different point of view. At Schenectady, Professor Thomson pointed out, lived and worked that master mathematician and technical genius, Steinmetz. This circumstance, he insisted, assured Whitney a scientific atmosphere such as he thrived upon.

Whitney found it was so. On his very first visit to Schenectady, he met Steinmetz. The two struck common ground at once. When the question of practical procedure was broached, Steinmetz invited Whitney to occupy space in his “barn laboratory” in the rear of his bachelor rooming house on Liberty Street. He also offered Whitney the services of his laboratory assistant, J. T. H. (“Tom”) Dempster. And thus the General Electric research laboratory was launched.

For some time Dr. Whitney gave only part time to the new venture, going to Schenectady for a few days a week, usually at week-ends. He was still a bit doubtful concerning the policy which the corporation would pursue toward a line of work that, he well knew, would not yield dividends in dollars and cents for an indeterminate period. As time went on, however, he discovered that the policy was broad, sympathetic and patient. The corporation executive with whom he came in contact most frequently, Edwin W. Rice, Jr., then technical director of the Company, was appreciative and encouraging. Whitney was not pressed for quick results, nor were his financial appropriations pared down. And so, before a year had passed, he gave up teaching and located permanently in Schenectady.

By that time the laboratory had advanced from the Steinmetz barn to a little building within the works, and the actual association between Whitney and Steinmetz was thereby to a large extent concluded, although they remained fast friends and on occasion professional consultants. The building now occupied by the laboratory was a shed-like affair located on the low river flats, and in the spring of the year the turbulent Mohawk would inundate the surroundings, spread into the basement of the building and set the laboratory's stock of chemicals afloat.

The following year the laboratory was given space in one of the large buildings of the plant. The first big research trail had just then been struck and the little staff was pressing eagerly along this new pathway, Whitney himself leading the expedition. He had developed a high-temperature electric furnace, and in the course of many experiments he treated the carbon filaments of incandescent lamps in this furnace, with unexpected results. The filaments were greatly improved, underwent a pronounced change

in their characteristics and became the means of developing a superior incandescent lamp of greater efficiency than any preceding type. And this, as it happened, was one of the real purposes in establishing a research laboratory. Thus, at the end of about five years, the new laboratory began to pay real profits, which could be placed in the balance sheet of the corporation.

After that growth began to assume impressive magnitude, Dr. William D. Coolidge, who succeeded Dr. Whitney as director of the laboratory, was obtained in 1906 to work on tungsten; and six years later he achieved the feat of transforming tungsten from a brittle into a ductile metal. Dr. Irving Langmuir, now associate director of the laboratory, came in 1909 to investigate various phenomena within the vacuous interior of the lamp bulb; and within five years he had brought out his gas-filled incandescent lamp, making possible lamps of high wattage and of much greater illuminating efficiency. Still later came Dr. Albert W. Hull and Dr. Saul Dushman, as well as a small regiment of trained assistants, both men and women, until by 1920 there were more than three hundred workers in the laboratory, about half of whom were trained scientists.

True to form in scientific research, the investigations of both Coolidge and Langmuir forked into unexpected advance roads as they proceeded. Their work also was inter-related. Coolidge, with ductile tungsten and with the benefit of Langmuir's advanced work, produced the modern high-power X-ray tube and the portable X-ray equipment. Langmuir followed an intricate and prolonged line of investigations that culminated in the high-capacity electronic tube, the heart of radio broadcasting and receiving. His fundamental work, carried forward by Hull, brought to pass new types of tubes, especially the versatile thyratron. Still later Langmuir developed atomic hydrogen welding.

Meanwhile the laboratory, pressing incessantly into new fields, by its collective work produced many new forms of useful insulations; new alloys for resistance units and other purposes; new processes, both laboratory and factory; new articles of manufacture; new materials, such as water japan and genelite; new electric furnace products like boron carbide; new laboratory tools; high resistance units for lightning arresters; improved carbon and graphite brushes, and brushes of new composition; fluorescent, sodium and mercury lighting; Alnico magnet material; and Carboloy cutting tools.

Only those associated in the laboratory with Dr. Whitney realize to what extent these results have been brought about by his directing work and influence. Its accomplishments have been due primarily to him. Added to his broad scientific knowledge have been the charm and vigor of his personality, guiding and inspiring all his associates, building a great *esprit de corps* by reason of his democratic and magnetic disposition. The laboratory has often been described as a monument to Dr. Whitney, and no one in the General Electric Company of New York disputes the assertion.

The laboratory has been called the “House of Magic.” Such it can well be termed, and most magical of all, perhaps, is the way in which the laboratory itself has grown and expanded, has probed into the unknown and has pushed farther and farther out ahead of man's civilization, under the captainship of Willis R. Whitney.

The Japan-Korea Tunnel

The Railway Department of Japan announced on December 21 that preliminary geological surveys for the proposed Japan-Korea undersea tunnel would be undertaken in next fiscal year and the bill appropriating ¥800,000 for the surveys would be submitted to the Diet.

The construction of the tunnel will cost ¥1,000,000,000, and it will enable trains to cover the distance between Kyushu and Korea in two hours, whereas the ferries now plying require eight hours.

The tunnel will connect Karatsu, a well-known seaside resort in Kyushu and Fusan, the southern terminal of the Korean Railway, by way of Iki and Tsushima Islands. A standard gauge track will be laid, and electric trains will be run at an average speed of 100 kilometers an hour.

French Interests in China

THE way in which France has succeeded in safeguarding her moral and material interests as well as her prestige in China during the present crisis has been admired by all observers. This was specially noticeable in Shanghai, where France is the only Power to possess a Concession of her own.

It is a well-known fact that France is a great Asiatic Power, owing to Indo-China, which is a prosperous country with a population of 20,000,000 inhabitants, but what is not so generally well known is the fact that France holds a very important place in China owing to the Concessions she controls in four of the largest cities: Tientsin, Shanghai, Hankow and Canton. Though the Concessions in the last two centers are small, those in Tientsin and Shanghai are populous and active cities.

The French Concessions in China are territories under Chinese sovereignty in which France, by delegation of the Chinese Government, exercises the rights of municipal administration and police duties, and where she assumes the responsibility of maintaining public order. The Concessions have proved an excellent ground for the development of that friendly co-operation which does honor to both nations.

Founding a City

The most important Concession is that in Shanghai, established in 1849 and successively enlarged in 1861, 1900, and 1914. It is situated between the Chinese city Nantao and the International Settlement; it is over four miles long, while slightly under two miles wide. It was originally a barren strip of land, dotted here and there with miserable huts and tombs and bordered by insanitary creeks and muddy ditches. In less than half a century the French have transformed that unprepossessing piece of waste land into an opulent and famed city. This splendid result is due to the tenacity and to the spirit of enterprise of the French, and to the far-sighted wisdom of their authorities, as well as to the support granted them in their work by the Chinese and the other nationalities who had come to find in the French Concession the security and freedom necessary for the pursuance of their activities.

The population has steadily increased from year to year and has kept pace with the growth of the rest of Shanghai. From 92,000 inhabitants in 1900 the number rose to 150,000 in 1915 and reached 500,000 in 1936. This last figure includes more than 50 different nationalities, notably 4,000 Britons and 20,000 Russians, while the French community numbers 3,000 without counting the land and sea forces now garrisoned in the city.

The Chinese population, already very dense previous to the Sino-Japanese hostilities, has nearly doubled since last August. Hundreds of thousands of refugees crowded into the Concession hoping to find shelter on territory under French administration, with the result that the Chinese population in the Concession may now be estimated at 1,300,000. One can readily imagine the problems the French authorities are daily forced to meet after an influx of such considerable proportions, and the manner in which they have coped with the situation has added to the reputation which the French possess of being able to face with the minimum delay the most difficult emergencies. Great is the admiration felt for the way in which the authorities, despite the enormous influx in which all nationalities are represented, have maintained public order, general safety, and respect for international regulations.

The Administration

Like all other concessions under French rule in China, the Concession in Shanghai is placed under the authority of the French Ambassador, upon whom depends the settlement of political and diplomatic problems which might arise. He has also under his control the land and sea forces stationed in China.

The most important factor of France's administration of her concessions in China is an Assembly representative of the various elements of the foreign and Chinese population in the concessions. This Assembly is presided over by the Consul-General, whose power in municipal matters is very wide and even more so in matters regarding public safety. The entire police force is directly under his orders and the land and sea forces are at his disposal in case

of necessity. This concentration of authority in his hands has greatly facilitated prompt decisions being taken in the present crisis which has prevailed in China in the past year.

The forces called upon to maintain order and safety are divided into two principal groups: a modern mechanized police force of over 4,000 men, and three battalions of French Colonial troops commanded by a colonel.

The Concession is administrated in accordance with the most up-to-date methods and no branch of its administration is in any way inferior to those in the largest cities of Europe and America.

A glance at the budget confirms what has been said of the rapid development and present importance of the Concession. From 254,000 taels in 1900 this budget has risen to 9,815,000 Mexican dollars in 1938. The balance-sheet of the municipal council is most interesting. We find, for instance, that on December 31, 1937, the liabilities amounted to 26,000,000 Mexican dollars, representing the unredeemed portion of the capital of fifteen municipal loans issued since 1903, while, on the other hand, assets amount to 195,000,000 Mexican dollars.

Education

There are six municipal schools. During the 1937-38 term 3,267 boys and girls were enrolled in these institutions. The Collège Municipal, which operates under a curriculum corresponding to that of French secondary schools, is educating students to the Baccalaureat examination standard. Besides these municipal schools there are numerous private religious and laical institutions. The Chinese schools alone in the Concession included 54,000 students in 1937-38. Among these non-municipal schools is the well-known Aurore University, an important body under the direction of the French Jesuit Fathers.

French influence is also felt in many other forms. For instance, it is thanks to the "Cassie des Oeuvres d'Intépôt Public" and to donations from the French Government, added to the fees paid by the patients, that St. Mary's Hospital exists. This is the most important hospital in the French Concession and belongs to the Catholic Mission of Shanghai. In 1937 nearly 10,000 patients were received and treated by the 10 medical practitioners, two surgeons, three military doctors, and one X-ray specialist, all of whom are Frenchmen. Medical assistance is also extended to the poorer classes of the population by means of free consultations for those who are unable to pay the fees. Finally there is a medical institution of which the Concession may justly be proud, for in the near future it will be an important center of scientific research which will do honor to French medical science. This is the French Municipal Laboratory, to be transformed in the course of the present year into a branch of the Institut Pasteur of Paris. This great improvement was made possible by the generosity of the French Municipal Council, which liberally contributed to the erection and equipment of a magnificent pavilion.

Public Health

With these medical institutions, the Municipal Council in the French Concession has organized an important public health service, the purpose of which is to maintain sanitary conditions among the inhabitants by means of strict supervision over activities such as the control over the markets and the milk supply, over health conditions in industrial and commercial enterprises, etc., and by combating epidemics, compulsory declaration of certain diseases, disinfection of homes, and vaccination, particularly against cholera, for which in 1938 1,765,000 injections were given in four-and-a-half months.

These various welfare activities are supplemented in the social and cultural field by efforts destined to propagate French civilization in the Far East. The "Alliance Française" possesses a library of 25,000 books and a reading room and organizes lectures and theatrical presentations of French plays, with the assistance of amateur actors. A radio station broadcasts in French three times daily. The broadcasts include cultural talks and recordings.

Many clubs have been founded in the French Concession, the most important of which is the Cercle Sportif Français, more widely known as the French Club, which includes more than 2,000 French and foreign members.

The list of activities would be incomplete were mention not made of an institution which does honor both to science and to humanity—the Siccawei Observatory. Thanks to the French Jesuit missionaries who founded it in 1873 the former little meteorological station has become the nerve center of a first-class scientific organization. It includes a maritime service which prepares weather reports twice daily, a time station which takes care of problems of longitude and duration, and an astronomical and a geophysical observatory.

It is due to the Siccawei maritime service that the dreaded typhoons in the China Seas are observed from the moment of their formation and their movements reported to all vessels as soon as possible. The observatory has saved thousands of lives from shipwreck and has gained recognition from all seafaring men.

Such are the principal elements which form the framework of the French Concession in Shanghai. It will be readily admitted that they are worthy of any great Western city, and when one recalls that less than 50 years ago this agglomeration had all the characteristics of a Chinese town of the Middle Ages, the extent of the stride forward can be measured.

It is difficult indeed, owing to the way modern business is interwoven, to determine exactly the importance of foreign interests in one country, and this is certainly particularly so in a city like Shanghai which is probably the most international metropolis in the world to-day, and where foreigners are able to reside and trade with a liberty undreamt of in many countries.

The result is that, while firms established in Shanghai show a natural preference to deal with their own nationals, they do not pursue an exclusive policy; exporters look for connections in all the countries interested in their lines, French importers deal with Great Britain or Scandinavia as well as with France, while some French agencies are handled by German or American firms; French capital is invested in local companies registered at Hongkong, while shares or debentures in French companies are owned by Chinese, Belgians, or Italians.

In spite of this state of affairs, an endeavor is made here to give an idea of the importance of the French economic interests in Shanghai.

As soon as communications are established between two countries, there is also trade between them. Trade was already flourishing between France and China more than a hundred years ago, and it may be recalled that when the Chinese Government granted in 1849 a French Concession at Shanghai its idea was to provide the French merchants with an area where they could establish themselves, as it was not considered desirable by the Chinese authorities that foreigners should reside in the native cities.

According to the Customs statistics, foreign trade between China and French territories exceeded \$90,000,000 in 1936 and \$100,000,000 in 1937. Exports are usually greater than imports. They were valued at about \$55,000,000 during these two years, while imports amounted to \$36,000,000 in 1936 and reached \$45,000,000 in 1937.

Silk to France

In the nineteenth century silk was the leading product which changed hands between China and France. China was famous as a producing country and Lyons had no rival at the time for making silk piece goods. Times have changed and no more are there such monopolies, but France remains one of the principal purchasers of Chinese silk. In 1936, out of a total export value of \$44,500,000 from Shanghai, more than 40 per cent was shipped to France or French Indo-China, and the percentage nearly reached 50 on raw silk filature, \$14,375,000 out of \$29,750,000.

Most of the silk inspectors were of French nationality, and it was under the initiative of the French Chamber of Commerce and the leadership of a French expert nominated by the French Government that an Institute of Sericulture was established in 1917. Some years later it was taken over by the Chinese authorities.

Silk pongees are also bought in large quantities by France, and this country has been, during the recent past years, the leading purchaser of Honan pongees from Shanghai, \$450,000 in 1937 out of \$1,700,000 worth exported. Shantung pongees, worth \$300,000, were also shipped to France from Shanghai, but Chefoo is the principal exporting center.

Straw hats, coming mostly from the Ningpo district, are another product which has been regularly exported to France for many years. It was in order to develop this trade that Messrs. Olivier, de Langenhagen and Cie decided, 50 years ago, to establish themselves in China and opened a branch at Ningpo. Their direct successors are Olivier-Chine, who can be considered as the oldest French firm at Shanghai, and straw hats have always remained one of their main lines. France's percentage in this trade exceeds 25 per cent. In 1936, out of a total export of hats of \$4,050,000, France purchased \$1,200,000 and, of straw braids, \$570,000 out of \$2,300,000.

Tea is, of course, one of the most famous products of China. Since the beginning of this century, some ground has been lost in England to Ceylon teas, but exports to North Africa, more particularly to Morocco, have increased considerably. In 1937, more than one-third of Chinese teas exported from Shanghai were shipped to Morocco. Exports to Algeria were valued at \$2,500,000 and, if shipments to France, Tunisia and French West Africa are added, the total is over \$15,000,000—more than one half of the trade.

Heavy Duties

France purchased 40 per cent of the Shanghai shipments of musk, which is largely used for high-class perfumes, and she also had an important share in many of the other exports from China, such as eggs, hides and skins—particularly goat-skins—pig intestines, bristles, gallnuts, ground nuts, wood oil, ores, etc.

If the development of French imports generally has been hampered during recent years owing to the policy of the Chinese Government of imposing heavy duties on manufactured products, there were on the other hand in 1937 large imports from Indo-China of two products most vital for the life of Shanghai residents—rice and coal. These products were usually supplied by the other districts of China, and Shanghai found itself suddenly cut off in August, 1937, from its normal sources. The stocks held in Shanghai were not excessive and the situation was aggravated by the fact that a large part of these, especially coal, were stored in districts inaccessible owing to military operations and were requisitioned by the Japanese authorities as enemy property.

The Supply Committees of the International Settlement and of the French Concession went through anxious times. Fortunately, Indo-China was near to hand and able to make prompt shipments, which, being supplemented with coal from the Kailan mine and rice from Siam and Burma, enabled this critical period to be passed over. Even if there is no more heavy fighting in the vicinity of Shanghai, and if some transports from the neighboring districts are reorganized, the situation is still far from normal, and it is always liable to deteriorate within a very short time. Although Indo-China would not be in a position to fulfil the whole needs of Shanghai, its proximity remains invaluable in the present times.

During 1937, out of a total of 345,000 tons of rice imported in Shanghai, more than one half came from Indo-China—184,000 tons, valued at \$21,500,000. During the first months of 1938, imports were still large and came almost entirely from Indo-China—58,000 tons out of 62,000. Among the leading importers, the firm of Louis Dreyfus and Cie, which has branches all over the world, has its own fleet of vessels specially built for the cereals trade.

Anthracite Supplies

In spite of the development of the anthracite mines of Shansi, Honan and Shantung, the French mines of Indo-China were able, during these last years, to continue to send a very substantial tonnage, surpassing 200,000 tons. In 1937, the prospects, before the war, were very bright, owing to the rapid enrichment of China and the increase in its buying power. The Sino-Japanese conflict having suspended the shipments of anthracite from North China, the French mines of Indo-China have become, for the time being, the sole suppliers of anthracite on the Shanghai market. It is probable that the imports for 1938, if the general situation remains stable, will exceed 400,000 tons. The principal suppliers are the "Charbonnages du Tonkin," whose Hongay open mines, extending over 133,000 acres, have a world-wide reputation. Some shipments also come from the "Charbonnages de Dong-Trieu" and from small native mines.

French import interests are represented in Shanghai either by French companies who have established their own branches, such

as Etablissements Kuhlmann, Schneider and Cie., Sté. d'Electro-Chimie d'Ugine or by local firms such as Baboud, Mary and Cie., Egal and Cie., Olivier-Chine, Racine and Cie., Rondon and Cie., Sté. Française des Téléphones Interurbains, who are acting as general importers, buying mostly from France, but also from other countries. Some companies are also represented locally by foreign firms.

In heavy metals French companies particularly interested in the Shanghai market include Hauts Fourneaux de Pont-à-Mousson, Comptoir Sidérurgique, les Petits-Fils de F. de Wendel, Schneider and Cie., Tréfileries du Havre.

Chemicals have become one of the major French heavy industries and among the firms dealing in China may be named Alais, Froges and Camargue, Etablissements Kuhlmann, Matières Colorantes and Produits Chimiques de St.-Denis, Rhône-Poulenc, Sté. d'Electro-Chimie d'Ugine.

In the industrial section, the Société Alsacienne de Constructions Mécaniques has been supplying equipment for cotton and woollen mills, St.-Gobain is a regular shipper of plate glass; Citroën and Renault cars and trucks have faithful customers, Chinese and others as well as French, who appreciate the reliability of the engines and their low running cost.

Cartier-Bresson and Dollfus-Mieg have a good share of the cotton-thread market, especially for embroidery. French woollen serges are imported in fairly large quantities; Lyons silk piece goods have fallen off owing to the development of the local industry. French cigarette paper, which used to share the market with Italian paper, has also lost ground, as many local factories give preference to the much cheaper Japanese paper.

Demand for Medicines

Foreign pharmaceutical specialities have been increasingly in demand during past years as the advantages of modern medicines became more widely known, and hundreds of Chinese doctors graduated from foreign universities. All the leading French laboratories are represented in this market and several of them have made special efforts to develop their oriental trade.

French perfumes have a world-wide reputation, and such firms as Coty, Guerlain, d'Orsay, Bourjois, Piver, and Crème Simon, are of course represented in Shanghai. Although, like other high-class products, they have suffered severely from the crisis and the high duties imposed on them imports of perfumery, cosmetics, face powder and creams, represent about 25 per cent of the total imports in Shanghai, France being the leading country for face powder and creams and standing second to America in perfumery and cosmetics. Owing to the very high cost of the imported article, many Chinese factories had been erected to manufacture locally soaps, creams, and perfumes, and there was an increasing trade in essential oils, essences, etc., of which France had its share.

A line in which French imports are prominent is, of course, the wine trade. Very heavy duties, reaching sometimes 250 and 300 per cent have been imposed on wines and liquors since the tariff autonomy was granted to China; the normal consequence was a reduction of trade, and even, for some articles, a diminution of the custom revenues. On the other hand, the development of social intercourse between Chinese and foreigners, the return to their homeland of foreign-educated students, helped in some way to sustain the trade. In champagnes France has, of course, a monopoly and such firms as Heidsieck Monopole, Charles Heidsieck, Piper Heidsieck, Mumm, Roederer have their local agents. Still wines represent the bulk of the trade and are mostly shipped by Eschenauer, Dufouleur, de Luze, Kressmann, Moreau and Fils, Hasenklever, Regnier, etc., and brandy is much favored by the high-class Chinese. All the well-known liquors such as Bénédicte, Pippermint (Get), Grand Manier, Vieille Cure, Rhum St.-James, and the aperitifs Dubonnet, St.-Raphaël, Picon, Noilly Prat (Vermouth) enjoy also a regular sale. Mineral waters were imported on a large scale years ago. Owing to their high cost and to the progress of local factories, St.-Galmier and Evian are not frequently seen as table waters but Vichy, Vittel and Contrexeville are still retained for their medicinal properties.

Other articles mostly imported for the foreign community include dresses, hats, millinery, jewellery, books, cigars and cigarettes from the Régie française, and there are few things purchasable in France which could not be found in one or the other of the local stores.

Industry

Special mention must be made of the Cie Française de Tramways et d'Eclairage Electriques de Shanghai, a company with a capital of 100,000,000f., which holds a 75 years' monopoly for supplying in the French Concession public transport, electricity, and water. This monopoly was granted from May, 1908, and the French Concession was at that time far from having reached its present development, its population being about 100,000 residents, against 500,000 at the beginning of the hostilities. The company had consequently to increase several times its installations, and its policy was to provide beforehand for the possible development of the Concession.

In 1937, consequently, it had at its disposal two electric power stations housing nine generating sets fitted with Diesel-Sulzer engines of 41,600 h.p. This enabled it to supply light and power without any interruption during the hostilities to a population suddenly swollen from 500,000 to probably 1,200,000 or 1,400,000 and to a greatly increased number of native factories when, after the destruction of the industrial districts, many factory owners tried to resume work.

As far as the water supply was concerned, the situation was very critical at times, as the plant and filters were located in Chinese territory and connected with the Concession by four pipes crossing the Nantao district. Fortunately, during the battle which ended in the capture of Nantao by the Japanese, the plant was not damaged, and only one pipe was burst. The company was able therefore to maintain a regular supply at all times, even during the present summer when the population of the Concession was at least twice its normal figure.

Public transport also was regularly provided except for the first three or four days, when the streets were thronged with refugees moving in with their furniture and baggage. It is estimated that the number of passengers carried this year in the company's tramcars, railless-cars, and omnibuses will reach 67,000,000.

Another important industrial concern is the local branch of the Far East Oxygen and Acetylene Company (Société d'Oxygène et d'Acétylène d'Extrême-Orient), with a capital of 10,000,000f., and branches and factories in China, Hongkong, Indo-China, Straits Settlements, which is very closely connected with l'Air Liquide de Paris. It was the first to introduce in China, some 25 years ago, compressed gas (oxygen and acetylene) and also the modern technique of oxy-acetylene welding. This was done through its own engineers, who trained native mechanics. Some years later the company erected in Shanghai the first oxygen factory of this country. In the following years many welding works were established at Shanghai and also in the interior, particularly in the railway workshops. The company then concentrated its activity in the sale of industrial gases (oxygen, acetylene, nitrogen, hydrogen, carbonic acid, argon, etc.), calcium carbide, and everything relating to oxy-acetylene welding and electric-arc welding.

The Société Franco-Chinoise de Constructions Métalliques et Mécaniques, more commonly known as Kiousin Dock, holds a very prominent place in Shanghai for naval, mechanical and metallic constructions. Besides repairing and overhauling, its marine department is in a position to design and build passenger, cargo, and oil tank vessels up to 250-ft., as well as river naval craft of all types, and its engineering department makes boiler works, forgings, castings, steam engines, armored cars, etc. Since 1936 Kiousin Dockyards have undertaken the construction of Diesel engines type KSD (Kiousin Diesel) and these met with an instant success; some 40 Diesel engines of 60 to 180 h.p. have been delivered and put in operation with complete satisfaction.

Olivier-Chine own at Pootung a modern press-packing plant where, before the hostilities, about one-half of Shanghai raw cotton was packed through an hydraulic press; they are also packing there cotton waste, goatskins, etc. In August, 1937, the Japanese cruiser *Idzumo* moored just opposite this plant, from which it was separated by some 200 yards. Shells drawn by the Chinese mortars or from the *Idzumo* were daily flying above it, and it was a piece of good fortune that damages were only slight. In June, 1938, the plant was able to resume work.

Three French garages—the Grand Garage Français, agents for Renault and Michelin; Universal Motors, agents for Citroën; and Auto-Hall, agents for Solex carburettors, are operating in Shanghai.

Banking

The first French bank to open an agency in Shanghai was the Comptoir National d'Escompte, more than 40 years ago. In 1899, through a private agreement, this agency was taken over by the Banque de l'Indochine, a limited company founded on January 21, 1875, with the privilege of issuing notes in French India and Cochin-China, privileges extended later on to Indo-China, French Oceania, and Djibouti. The activities of the bank developed greatly during this century. It has branches in Canton, Hankow, Hongkong, Peiping, Shanghai, Tientsin, Yunnanfu, and about 20 other branches in Indo-China, French colonies, Bangkok and Singapore. Its initial capital of 8,000,000f. was increased to 24,000,000f. in 1900 and, through gradual increases, to 120,000,000f. in 1931, fully paid. Its reserves amounted to over 138,000,000f. on December 31, 1937. The Banque Franco-Chinoise pour le Commerce et l'Industrie has a capital of 50,000,000f. It has agencies in Shanghai, Peiping and Tientsin, as well as in France and Indo-China. Besides the normal banking business it takes a special interest in the development of China, and was a party to the financing of the latest railway loans granted to China just before hostilities. The Union Mobilière, which has a capital of \$2,000,000, is mostly concerned with local banking business, handling deposits and financing local firms—commercial or industrial concerns as well as real estate.

The International Savings Society is a French Savings Society, established in Shanghai in October, 1912. Its capital is 1,000,000 taels, in addition to 8,000,000f. Its operations have been extended all over China and Siam, and special branches were established in France in 1924 and in Siam in 1926. The development of its business was extensive, and its mathematical reserve, which guarantees the savings of the bondholders, exceeded at one time \$66,500,000. Most of these funds were invested in Shanghai, especially in real estate in the French Concession, so that the International Savings Society is the French firm representing the largest real estate interests in the Concession. It was the first to erect in Shanghai large modern apartment buildings, and has been keeping the lead with the "Picardie," its latest building of 14 storeys and 86 apartments. The directors were prompted some years ago to create two other companies—the Foncière et Immobilière de Chine (real estate) and the Assurance Franco-Asiatique (insurance), in which they kept controlling interests. In addition, large investments have been made in local foreign companies, mostly land companies owning properties in both the International Settlement and the French Concession.

Shipping

Few concerns can boast of as long a co-operation with the Chinese and foreign interests in Shanghai as the Messageries Maritimes Co. The establishment of a regular "Messageries" mail service between France and Shanghai dates back to 1862, when passengers from Marseilles landing at Port Said were taken overland to Suez to resume their sea voyage towards Shanghai on board vessels of "Messageries Impériales." In 1869 the first commercial ship to proceed on the newly opened Suez Canal was the ss. *Peluse*, a liner of the Messageries Impériales. The M.M. maintains a fortnightly passenger service between Marseilles and Japan and a regular freight service which calls at Shanghai on the way to Japan or homeward bound to North Africa and North sea ports.

The passenger service was not interrupted during the hostilities, and out of 21 calls of passenger ships during the first two months following August 14 M.M. liners accounted for 14 of these. A great number of residents, Chinese as well as foreign, used these steamers to evacuate from Shanghai and were conveyed under the protection of the French Navy. For these services the M.M. were recently awarded a medal by the French Municipal Council.

Another French company—la Société Française du Haut-Yangtze—was providing a river service between Shanghai and Chungking. Owing to the blockade of the Yangtze, these steamers are now only plying in the lower Yangtze.

French insurance companies have long been interested in the Shanghai market. At the end of last century, la Confiance, l'Union, l'Urbaine of Paris had already agents in this city, and in more recent years l'Abeille, la Nationale, la Compagnie d'Assurances Générales also entered the field.

In 1918 the Assurance Franco-Asiatique was established with a capital of 3,000,000frs., which was increased in 1920 to 7,000,000frs. fully paid up. The head office was transferred to Paris in 1933,

but activity has not been impaired by this move. A large business is done in fire, marine and accidents insurance. The Compagnie Franco-Américaine d'Assurances was established in 1932. It has a capital of 3,500,000frs., and, as indicated by its name, is well connected with French and American groups. It covers various lines of insurance which is not confined to China, but has been extended to the Far East generally, particularly in Indo-China.

It is very likely in real estate that French interests in Shanghai are the more important, but it is very difficult to estimate them in an exact way, as most of these are privately owned.

The Foncière et Immobilière de Chine was established in 1920: its capital is taels 2,000,000 (\$2,800,000) fully paid up and, besides its own properties, it is managing those of the International Savings Society and of some French residents. Actually it controls 1,352 houses, 17 modern buildings consisting of 547 apartments and 98 shops, offices covering an area of 16,500 sq. meters, and godowns of an area of 10,000 sq. meters. The cost of these properties is around \$30,000,000. All the properties that have been built are in the French Concession and in the central district of the International Settlement, and therefore fortunately did not suffer any damage during the past year.

New Nine-Storey Building

The Société Immobilière d'Extrême-Orient was established in 1937, with a capital of \$1,500,000, its immediate object being to erect on the French Bund a nine-storeyed building to house the local agency of the Messageries Maritimes and provide modern offices for other concerns. The building was started during the spring of 1937, and the directors decided not to stop notwithstanding the hostilities and the consequent difficulties in obtaining the necessary materials. At one time cement and sand were unobtainable locally and had to be imported from Indo-China at a high cost. The building was ready for occupation at the end of this year, being the latest addition to modern office buildings in Shanghai, and it is to be hoped that the faith of the directors in the city's future will be justified.

The Société Anonyme Immeubles Racine is a privately owned company with a capital of taels 500,000 (\$700,000). The Cabinet Marcel Darré is managing various real estate properties, including those owned by the Crédit Franco-Chinois.

Large interests have been invested in the Crédit Foncier d'Extrême-Orient, a Franco-Belgian company, with a capital of 70,000,000 Belgian francs, and agencies at Shanghai, Tientsin, Hankow, Hongkong, Tsinan, Singapore. Besides its own properties, it manages also many private properties and grants mortgages to the owners.

Catholic Missions

Catholic missions in China have pursued a policy of investing in real estate most of the funds collected by them, in order to have regular incomes to provide for the needs of the missionaries in the interior. These investments, many of which were made at a time when the value of the land was very low indeed, run into considerable figures. If the properties owned by French local concerns or private residents and also by the French Municipality are added to the above, the value of the French investments in real estate must certainly exceed \$100,000,000.

A word might also be said regarding the interest displayed by the French community in sport. Two bodies have been formed, their respective objects being greyhound racing and *Hai Alai*.

The Champ de Courses Français (capital \$600,000) has certainly one of the finest greyhound racing tracks in the Far East; the area owned by the company is over 116 mows, about 20 acres, and the cost of the buildings exceeded \$2,000,000. In the kennels are 1,000 greyhounds. Meetings, which were only interrupted during the acute period of hostilities, are held several times a week and patronized by a large crowd of Chinese as well as foreigners. Inside the track are fine football fields where championship matches are regularly played during the season. Boxing events are held also in the Canidrome stadium.

The Parc des Sports was established in 1929, its main object being the game of Pelote Basque (*Hai Alai*) as played in Spain and Central America. A special "fronton" had of course to be erected and the company made arrangements with professional players to come and stay at Shanghai. They always number at least 30 and provide for necessary changes in the meetings, which are held daily,

(Continued from page 73)

Speed Over the Flying Routes

By ROBERT BERNARD, Author of *The Romance of The Flying Mail*

ONE of the outstanding features of air transport to-day, is the immense variety of the uses to which it is now being put. Take one or two of the latest examples available.

Here is a story which emanates from Hawaii. It concerns attacks which have been made on the pineapple crops there by a particularly troublesome kind of mealybug insect. Seeking some means of combating this plague, the entomologists in Hawaii learned from colleagues away in Kenya Colony (Africa) that they were struggling there with problems of a somewhat similar nature in connection with damage being done to the Kenya coffee crops by insect parasites. And it appeared that in the researches made by the Kenya entomologists they had ascertained that there was a particular type of insect called ladybird which could be relied upon to wage war against the species of mealybug causing damage among pineapples.

This being so, it was decided that a consignment of these ladybirds should be obtained, and that they should be placed in a special container with a view to their immediate transport by air over the 14,000 miles separating Nairobi from Honolulu.

After being placed in their container, these live ladybirds were flown from Nairobi to Alexandria.

Here they caught a big Imperial flying-boat of the England-Australia service, and went on in stages to Hongkong. And at Hongkong they were put aboard a Pan American flying-boat for their last stage to Honolulu. On being unpacked it was found that they had survived the journey well, and it was not long before they had been released among the pineapples to begin their battle against the mealybugs.

While discussing this particular story the other day, experts were recalling that there was a somewhat similar case, not long ago, in connection with the damage which was being done in Jamaica, among the banana crops, by a voracious type of weevil. While seeking for some means of coping with this particular plague, it was ascertained that in the Malay States there is a type of beetle, known as the dactylosternum which wages war relentlessly on the weevil damaging the banana crops. It was not long before a special consignment of these beetles, packed carefully in a specially-equipped travelling box, were on their way by a combination of air and sea transport from the Malay States to Jamaica. First they went by air from Singapore to Sydney (Australia) and then at Sydney they changed from airway to steamer, proceeding by the sea route to Jamaica. They—like the ladybirds previously mentioned—proved excellent travellers; and on completing their journey they were set free among the banana crops to begin their war against the weevils.

More and more, every day, is science discovering the uses which can be made of air speed. In England experts are waging a constant war in their

laboratories against insect plagues such as those caused by locusts and mosquitoes. And it is found that live specimens of such insects—required for laboratory purposes—can be air-borne for thousands of miles, from points overseas to England, completing in a matter of days journeys which would otherwise take weeks.

Another quite different use which science has found that it can make of the aeroplane was reported not long ago from America. Here research-workers have been seeking to throw light on the problem whether certain types of minute insects are being air-borne from one territory to another in high-altitude wind-streams. To secure data on this question, it was decided to make use of high flying aeroplanes. First of all, however, the scientists prepared special plates which were coated with an adhesive substance. Then these plates were fixed at suitable positions on the wings of the aeroplanes. After which the pilots were instructed to fly their machines to a high altitude and there manœuvre for a time in the upper wind-streams. And, while they thus flew their machines in these higher currents, the plates exposed on the wings were collecting and retaining specimens of any tiny particles which might be drifting in these upper "air-tides;" the plates being examined subsequently, by microscope, in the laboratories of the scientists who were undertaking this particular quest.

So much for science. And now take agriculture. Here reports from many different territories tell their story of the interesting use made of commercial aircraft in connection with all sorts of agricultural operations. More and more "crop-dusting," for example, is now being carried out from the air. Such "crop-dusting" is effected as follows. Aircraft fitted with special distributors under their fuselages fly low over large areas which are under crops and, as they fly, they scatter or "dust" chemicals which settle down and destroy any insect-parasites which may be lurking among the crops. And another use for low-flying aircraft is being found in sowing seeds from the air. Here, again, a low-flying 'plane, equipped with a special container, will pass to and fro over a specially-prepared stretch of soil, "sowing" seeds as it flies. And by such a method work can be accomplished in a few hours which would take days if carried out by surface methods.

While science and agriculture are thus making a growing use of aviation, our great trunk air-lines are being employed to an increasing extent by commercial firms and business houses. A fresh landmark in the use of the Empire air routes for business purposes was reached last Christmas, one big London store making history by preparing a fully-illustrated catalogue which has been printed specially for air transport from England to destinations overseas. And a feature about this particular price-list is that though it contains full information as to many seasonable gifts, accompanied by suitable illustrations, (Continued on page 73)

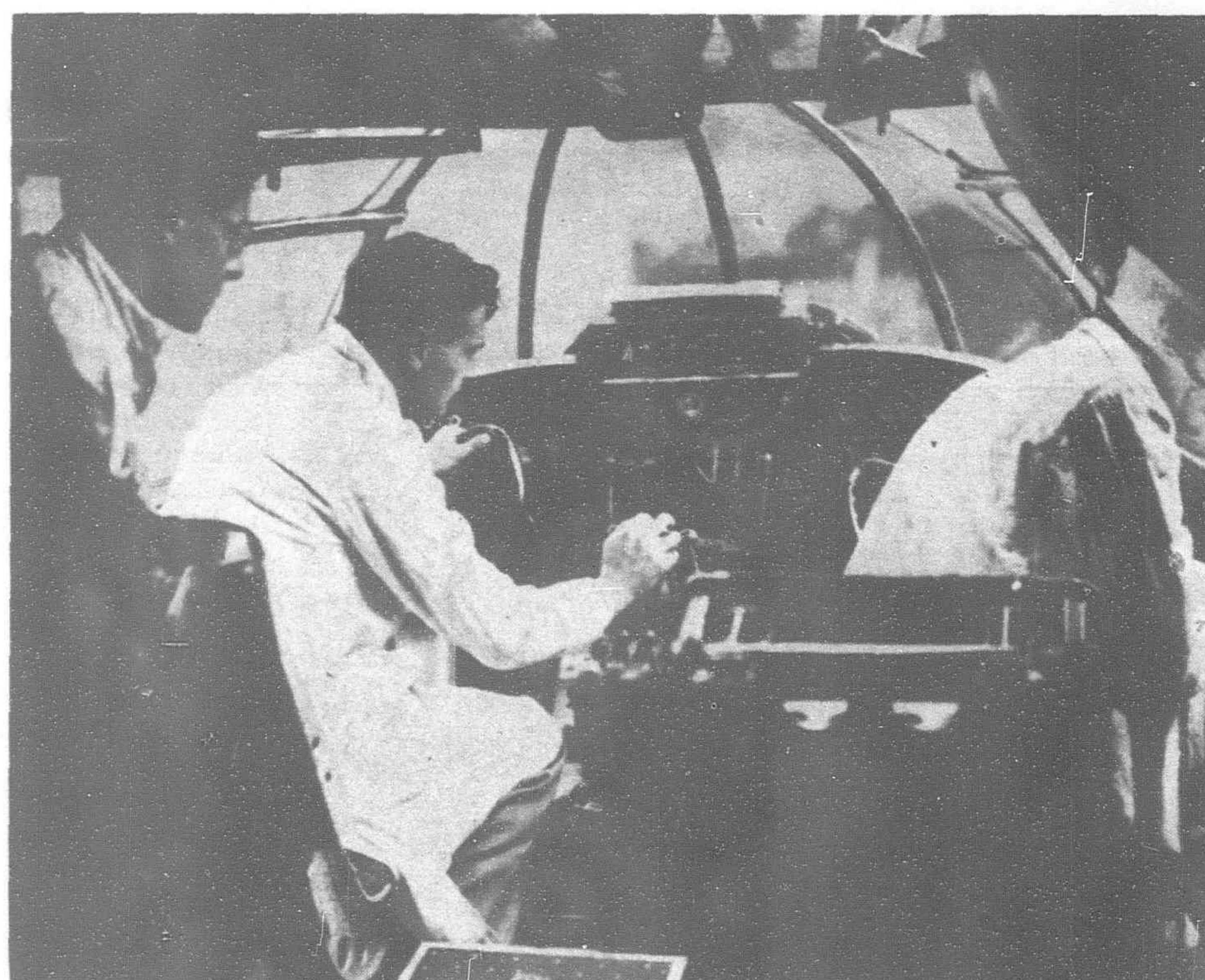


Photo by Evening Standard

Overhauling an Imperial flying-boat at the Airways Base at Hythe, English Terminus for All Empire Services. Picture shows controls and instruments in captain's control cabin being tested

New "Deep Foundation" Process Perfected by Japanese Engineers

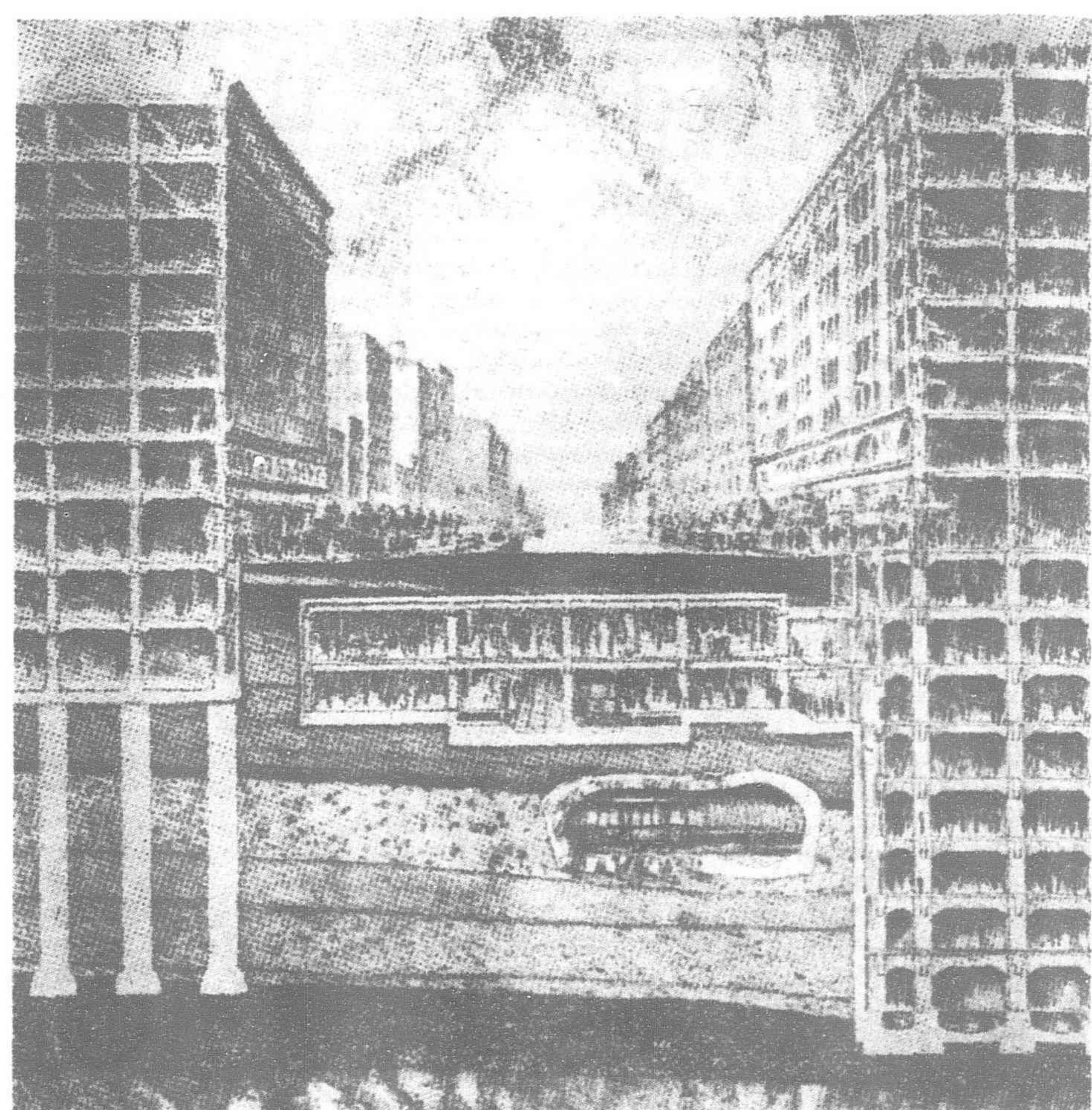
(From *The Japan Times*)

APROCESS for underground work, which may revolutionize all conventional present-day methods, has been introduced by Yasuzo Kida, who through the Shinso Kogyosha, Awajicho, Kanda, Tokyo, has been putting the scheme into practice in the construction of many large buildings. This process incorporates patented methods numbering more than 50 and is a decided saver of time and cost, completely removing all the defective points found in conventional processes and making the underground work for construction of buildings absolutely safe and secure. In addition to the deep underground work, it enables the construction of more subterranean floors, and by their increase, it incidentally makes the building quake-proof and affords more space for shelter in case of air raids. The benefits of this process therefore are manifold.

The "Shinso" (an established term literally meaning deep foundation) underground work is, to explain it in brief, to dig a shaft, by means of a special frame to be set up and a special process of excavation, straight from the surface of the earth deep into the firm ground sometimes to a depth of several score of meters, and thus enabling the constructors to see and touch directly the ground that is to support the foundation of a building, and by means of a fine testing machine the resistance of the ground can be carefully measured and analysed. Upon determining the area in this way, cement is poured, thus securely laying down a solid and colossal foundation.

By the application of this process foundation work is made absolutely secure and as the terrific noise and vibration which are attendant to the conventional processes are entirely removed, no damage is caused to places adjacent to the place of construction. It also enables the constructors to touch firm ground which lies sometimes at a depth that is impossible to reach by means of any piling method.

There is another process which is used in conjunction with the "Shinso" underground work, which is called "Shinso" construction process. This process is employed when constructing a building which has a number of floors underground. This is done first by putting columns into the ground which are prepared by means of "Shinso" underground work, and by spanning floor girders between the columns, these are to take the place of the conventional steel sheet piling and its support, and as the emptying work of the earth proceeds, to build by means of special mechanism, retaining walls from the surface of the earth downward. Next, the floor girders of each floor underground are spanned one by one in the same manner, and in this way any number of underground floors can be constructed safely, securely and easily. The application of this process also makes the steel sheet piling work unnecessary almost in its entirety, and the expense spent in the setting up of incidental outfits and installations required in the former processes of construction, having nothing to do with the building to be constructed, are entirely dispensed with, thereby saving much in cost of construction. But this is not all. By the

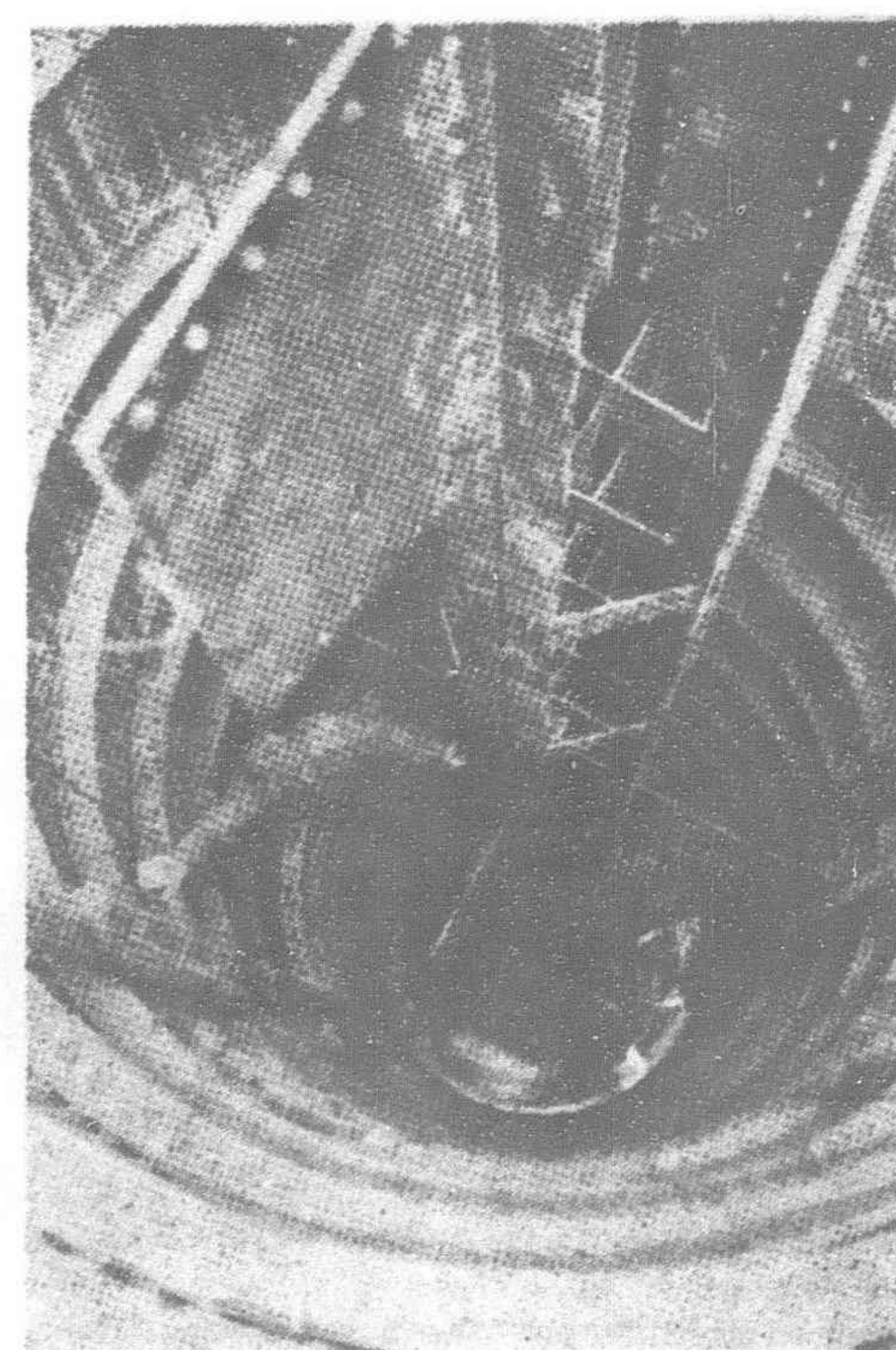


An artist's sketch of the Shinso process in use

conventional steel sheet piling work, it has been considered difficult to carry on work farther than 15 meters underground, but by the foregoing process the main structure of the construction itself can be made to take the place of steel sheet piling. Further the construction work can be carried on both underground as well as above the ground, thereby saving time by about one half.

This process can also be applied to all buildings standing today. By this process any number of underground floors can be increased. This is done by having the load of about a third or a fourth of the entire number of columns supported by other columns temporarily, and the "Shinso" underground work carried on under the said columns to the required depth, columns built, securely under-connected to the columns already in existence and thus to support the load above. This process is repeated one by one eventually to the entire building, and subsequently by means of the "Shinso" construction process the extension of floors underground is completed. The already existing part of the building can be used as usual with the exception of the lowest floor and the part which connects the said floor to the surface of the earth. No noise or vibration are caused by the work, nor loosening of the ground and incidental danger or trouble in the immediate neighborhood is obviated. This process therefore opens a new field for the extension of underground floors of all buildings, a matter which has never even been dreamed of formerly.

There is another field of application, and that is called "Ido Entotsu" meaning well chimney. This process can be applied to places where the upper seam of the ground is weak or the area is very narrow. In such



Close-up of one of the borings

(Continued on page 80)

The Kofler Automatic Train Blocking System

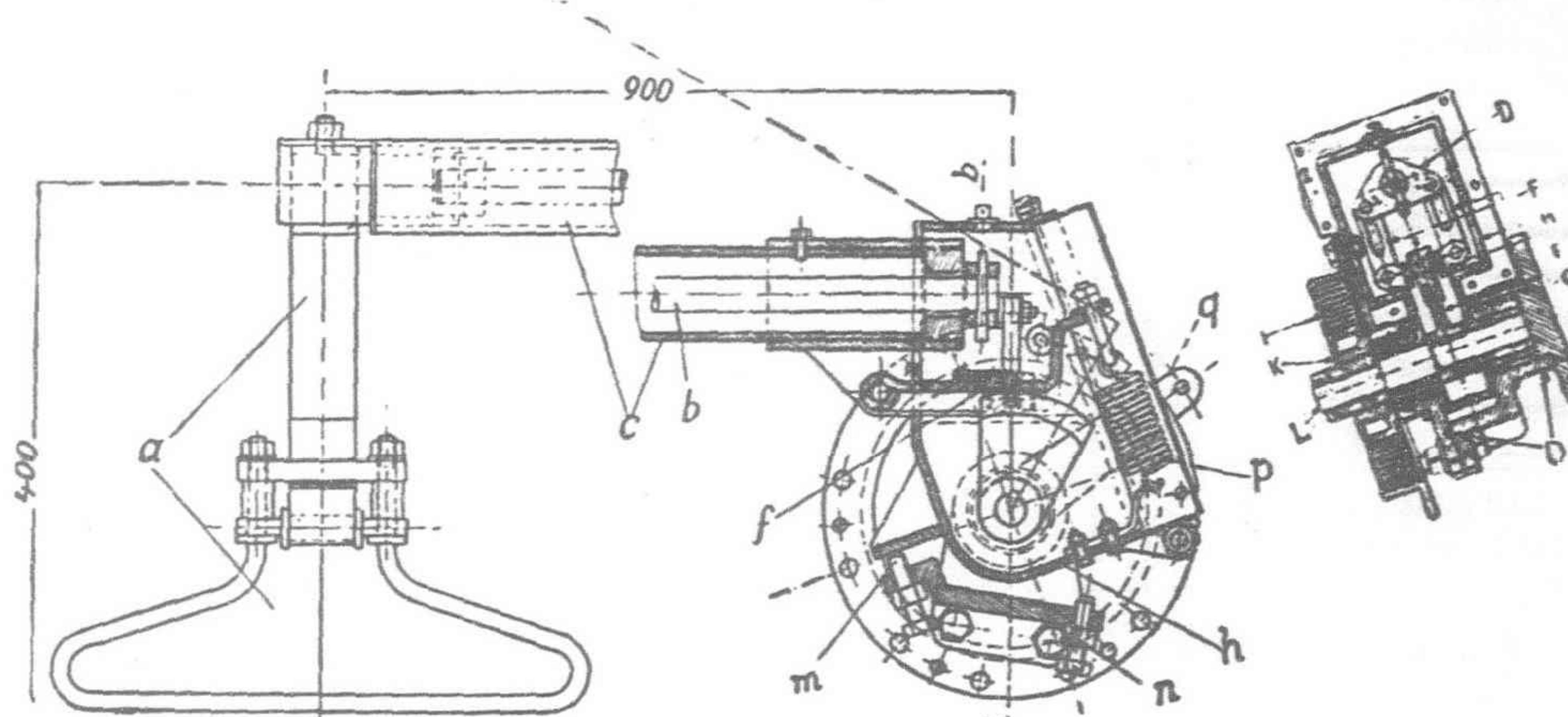
Notable Invention of Austrian Inventor put into Service on European and South American Railways

KTHE Kofler Automatic Train Blocking System, which is the invention of Mr. George Kofler, an Austrian engineer, is attracting the favorable attention of a number of railway administrations to the extent that this new mechanical signalling system is to-day challenging the long-established and much more costly electro-magnetic and electro-optical appliances generally employed on railways throughout the world.

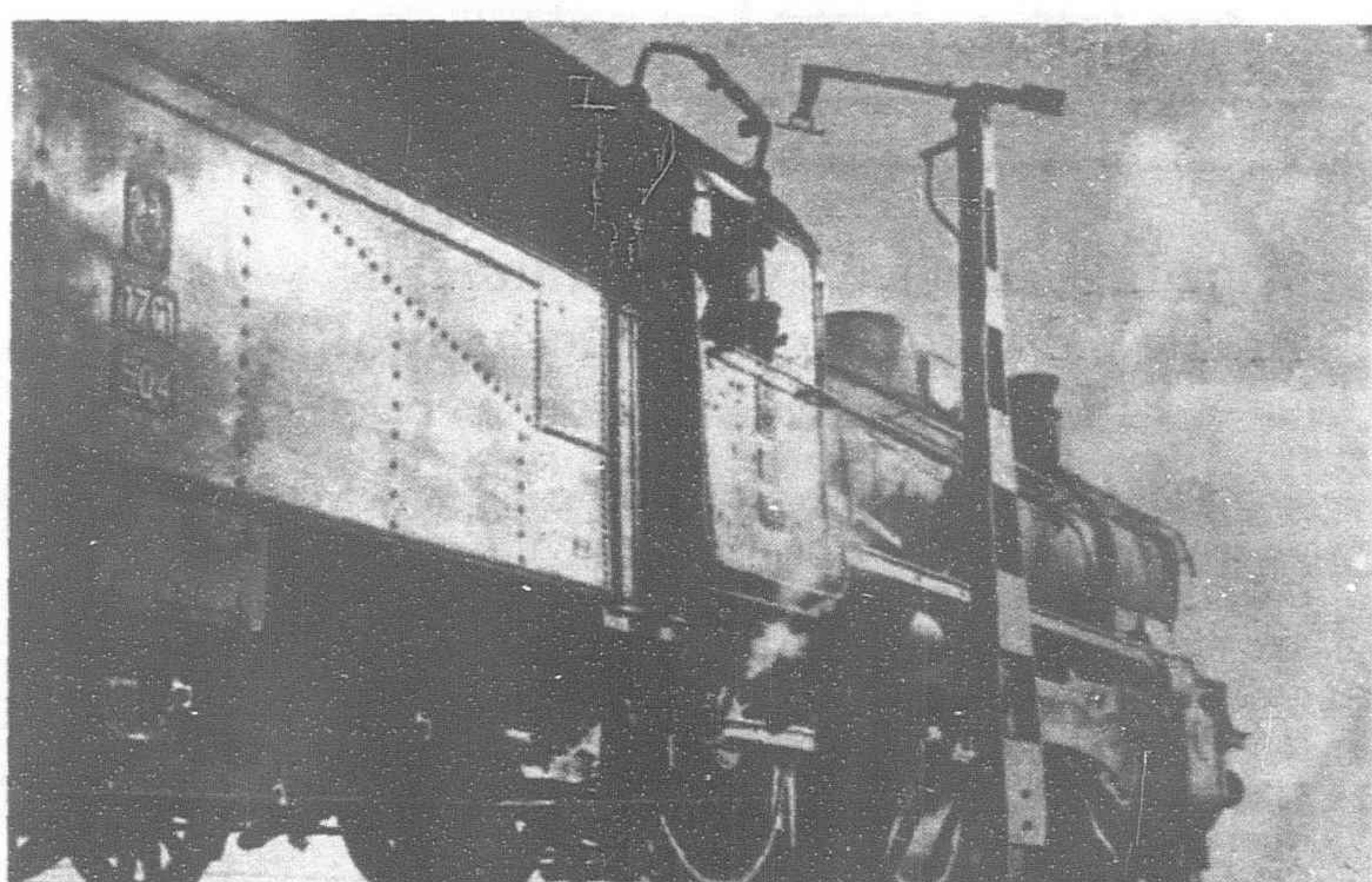
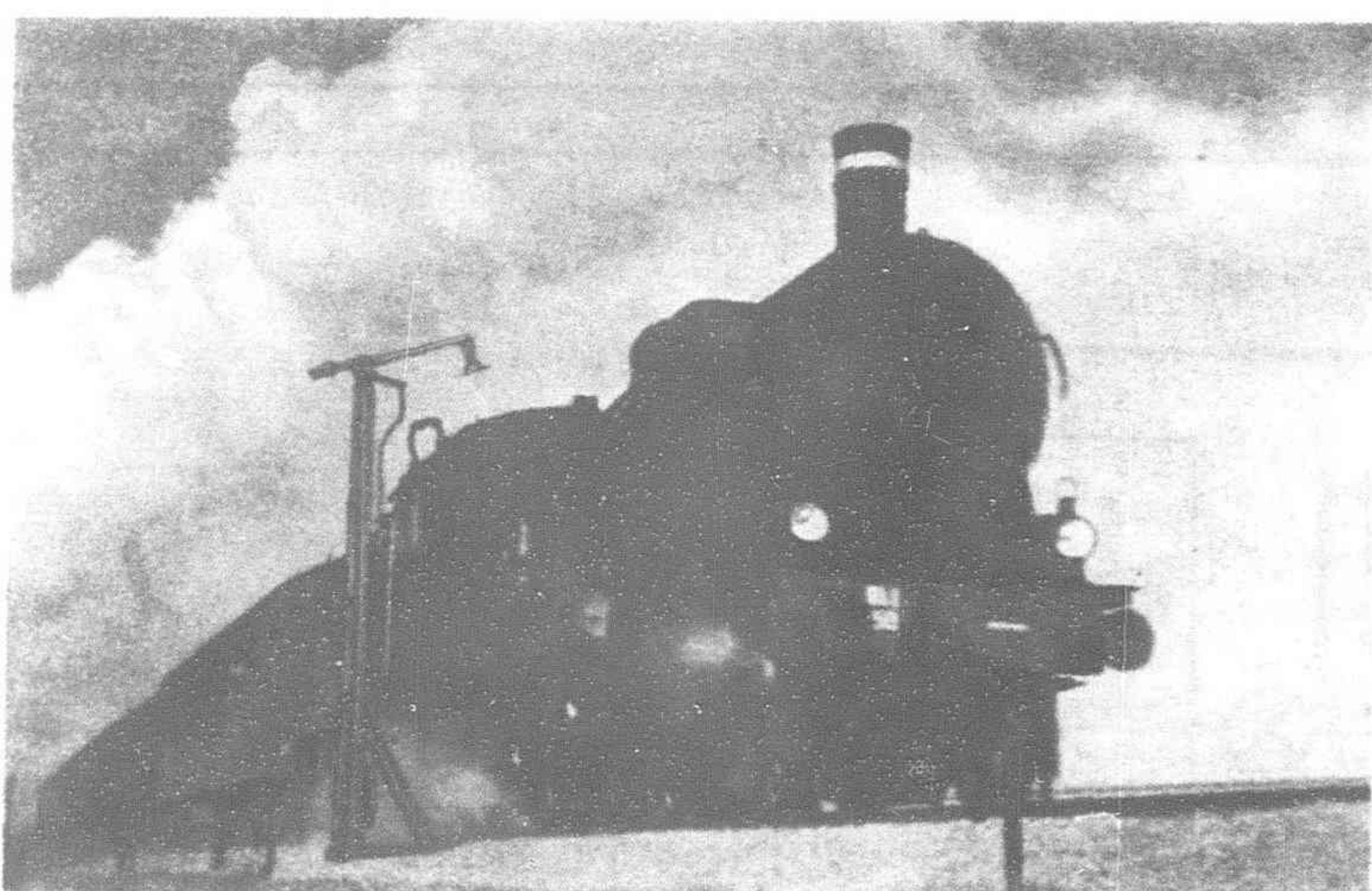
The Kofler Automatic Train Blocking System, which was originally described in the *Far Eastern Review* in May 1937, briefly, is a long step forward in completely eliminating human factors in the prevention of railway accidents. This remarkable safety device simply stops the train

whatever its speed may be at the place where the train should stop, and this is achieved whether the engine-driver sees signals that are against him or not. It is by so much that responsibility of engine-drivers is reduced through the agency of the Kofler Safety Device. Thus also is reduced the hazard which year after year is the cause of railway disasters all over the world.

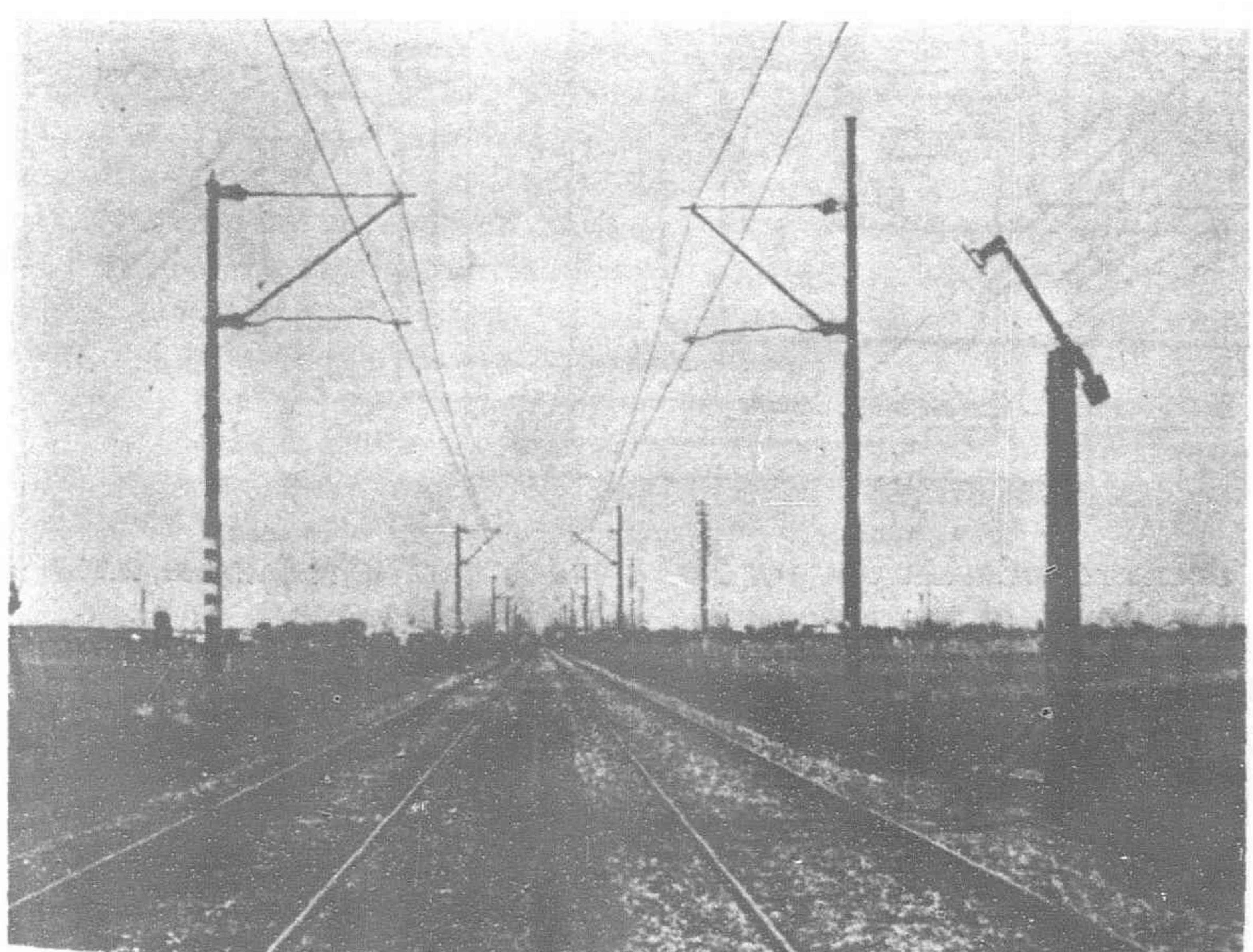
It is generally recognized by railway engineers that the margin of error in connection with the electro-magnetic system, in common use on railways, is fairly constant, and, therefore, it is foreseen that railway disasters cannot be wholly eliminated solely through the use of the electro-magnetic system, particularly when it is applied over long distances. Sound



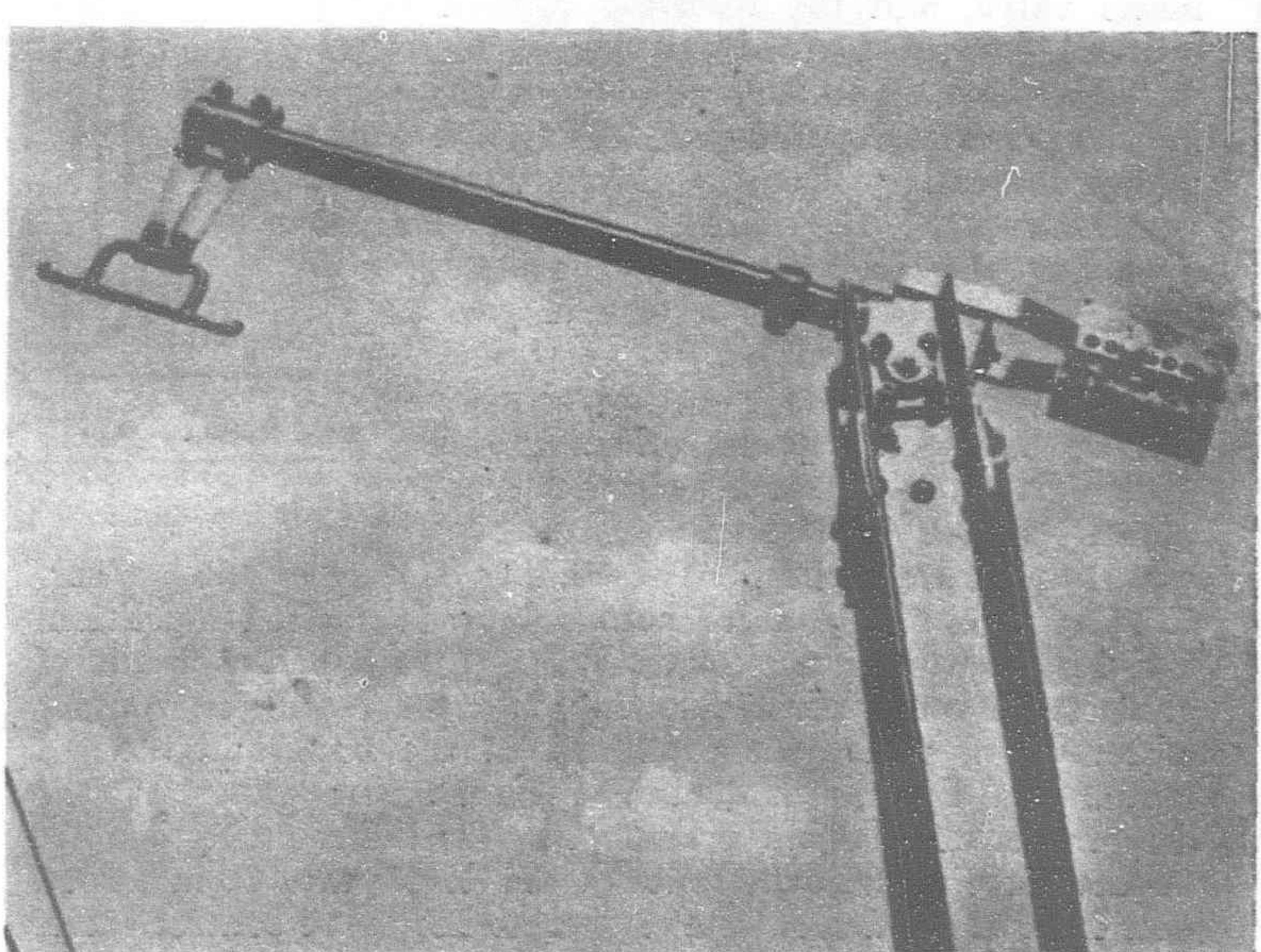
The Kofler mechanism as it applies to braking system



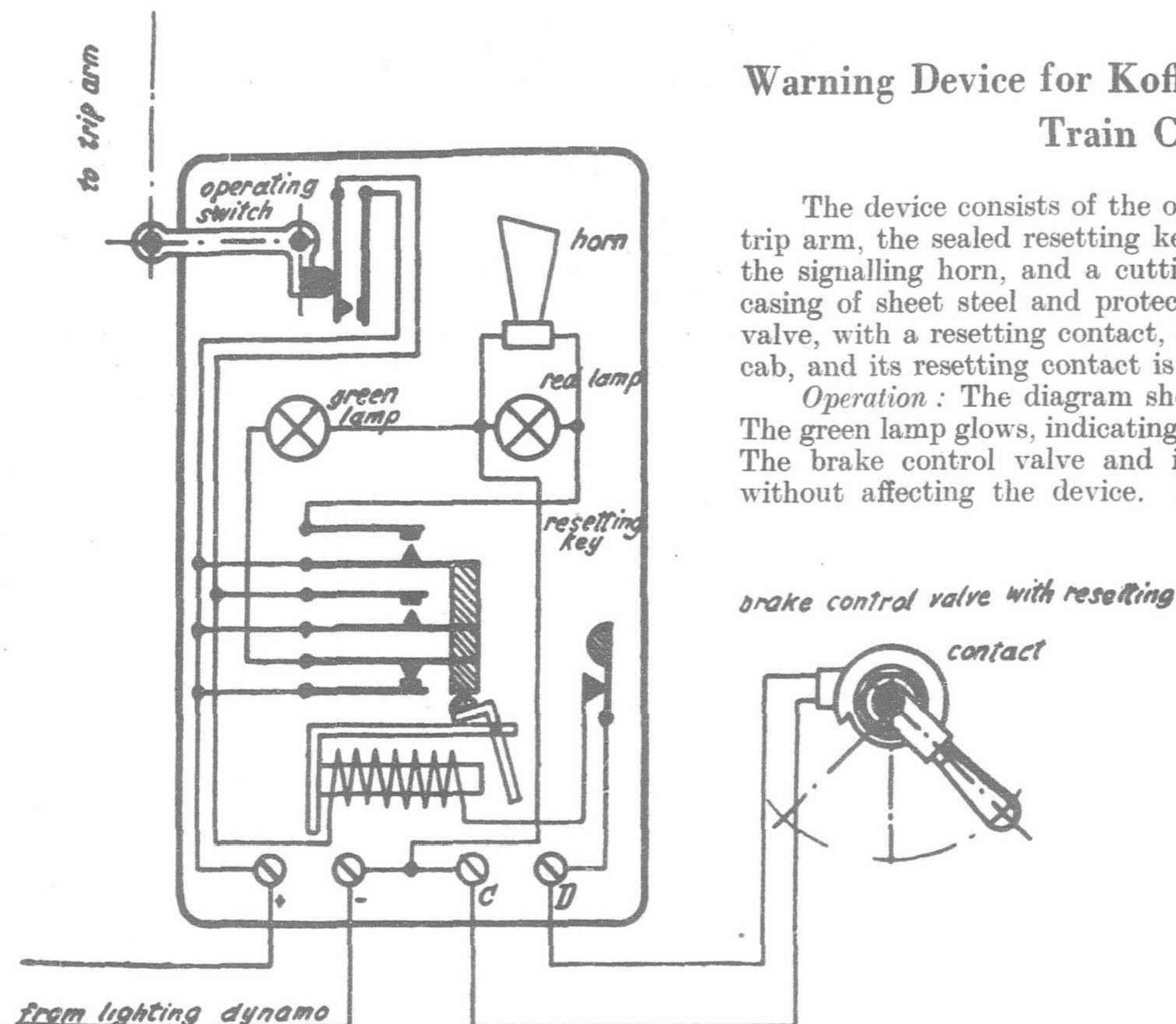
Above photos taken on Polish State Railways show mobile arm of Kofler device about to strike one of the control stirrups on engine which will actuate braking system and illuminate danger light and sound signal in cab of engine



General view of line, equipped with the Kofler safety device



Kofler apparatus seen in service on the Nord-Milan Railway



Warning Device for Kofler's Mechanical Scheme of the Train Control System

The device consists of the operating switch under the control of the trip arm, the sealed resetting key, the red and green signalling lamps, the signalling horn, and a cutting-in relay. All parts are housed in a casing of sheet steel and protected against damage. The brake control valve, with a resetting contact, is arranged in a suitable position in the cab, and its resetting contact is connected to the device by cables.

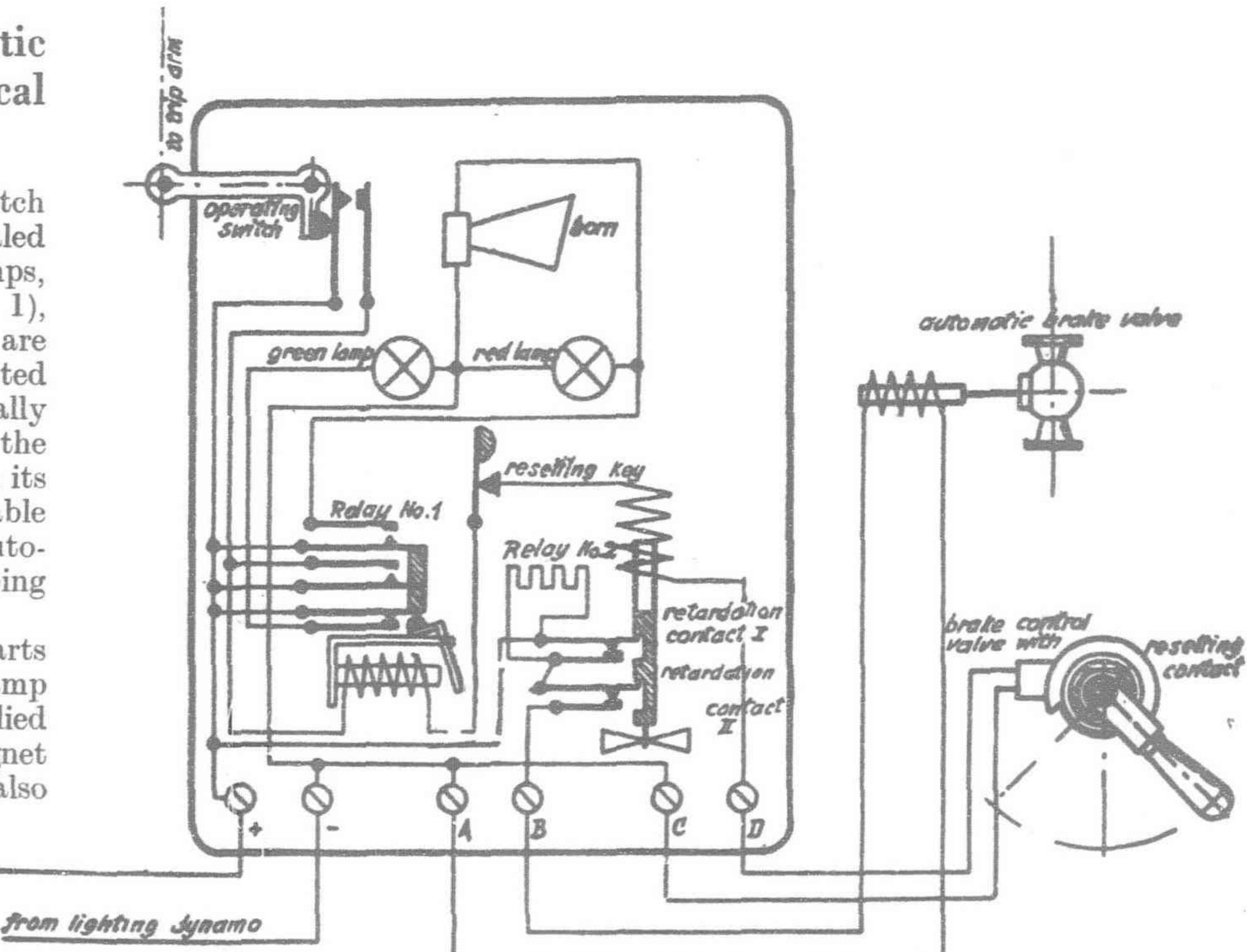
Operation: The diagram shows the parts in their normal positions. The green lamp glows, indicating that the device is supplied with current. The brake control valve and its resetting contact can be operated without affecting the device. If the operating switch is temporarily closed by the trip arm, the cutting-in relay is excited and maintained in this condition by its own holding contact. The interrupter contact of the relay breaks the circuit of the green lamp which ceases glowing, and its cutting-in contact makes the circuits of the horn and the red lamp.

The horn is sounded, and the red lamp glows, until the driver operates the brake control valve which, through its resetting contact, returns the parts of the device into their normal positions. The sealed resetting key is provided for exceptional cases.

Warning Device with Automatic Brake Valve for Kofler's Mechanical Train Control System

The device consists of the operating switch under the control of the trip arm, the sealed resetting key, the red and green signalling lamps, the signalling horn, a cutting-in relay (No. 1), and a retardation relay (2). All parts are housed in a casing of sheet steel and protected against damage. The electro-magnetically operated automatic brake valve, and the manually operated brake control valve, with its resetting contact, are arranged in suitable positions in the cab, the control of the automatic valve, and the resetting contact being connected to the device by cables.

Operation: The diagram shows the parts in their normal positions. The green lamp glows, indicating that the device is supplied with current. The circuit of the magnet operating the automatic brake valve is also supplied with current, and the magnet keeps the valve closed. The brake control valve and its resetting contact can be operated without affecting the device. If the operating switch is temporarily closed by the trip arm, relays Nos. 1 and 2 are excited. The holding contact of the cutting-in relay No. 1 maintains both relays in excited condition. The interrupter contact of relay No. 1 breaks the circuit of green lamp which ceases glowing, and the cutting-in contact of relay No. 1 makes the circuits of the horn and the red lamp. The horn is sounded, and the red lamp glows. If the driver operates the brake control valve, the resetting contact of this valve returns the parts of the device into their normal positions. If the driver fails to operate the brake control valve, the retardation relay No. 2, after an interval of six seconds,



opens retardation contact No. 1 which cuts a resistance into the circuit of the automatic brake valve's magnet, weakening the current in the circuit and allowing the valve to open partly and to set the brakes slightly. After an interval of seven seconds, retarding contact No. 2 is opened and breaks the circuit of the automatic brake valve's control magnet altogether, the automatic valve opens fully, and the brakes are now applied with full force. The brakes can be released by operating the brake control valve. The sealed resetting key is provided for exceptional cases.

basis therefore exists to give the most careful consideration to the general introduction by railway companies to an automatic signal transmission on a purely mechanical basis. German and Austrian engineers have long been in the forefront of extensive research into increasing the safety of railway transportation.

After extended trials on a number of widely separated railway systems operating under differing conditions and by differing methods, the claim is put forward that the major problem definitely has been solved with the apparatus invented by George Kofler. Accompanying photographs show the Kofler system in use on the Polish State Railways. Recently also Kofler installations were acquired by the Bulgarian State Railways, and on this system the line from Sofia-Mesdra has thus been safeguarded with the installation of thirty signals with the complementary equipment being placed on four locomotives. The Kofler Automatic Train Blocking System is also in use on the Brazilian Railways. Negotiations to arrange for tests of the Kofler system on the railways in China, and particularly on the Shanghai-Nanking Line, were interrupted by the outbreak of hostilities in 1937.

Drastic tests have disclosed that the Kofler system functions perfectly at train speeds varying between 90/100 kilometers an hour. No failures of the system have been recorded on tests made in Germany on the Munich-Thalkirchen Line, later, on the Cologne-Bonn Line, then in Italy, and in other countries at varying



Side view of the Kofler automatic train blocking device, built into existing signal tower

speeds and under differing atmospheric conditions.

The Kofler system is a simple lever transmitting system built into existing signalling devices without requiring extensive alterations of existing apparatus. The lever arm may be fitted to a signal tower or to a separate mast. It has a swinging movement with a sliding bow at its head, and when the signal is at danger it makes contact with a device or stirrup projecting sidewise from the roof of the locomotive or motor-coach. This sets the brakes of the train working, no matter what the speed of the train may be. The receiver actuates the braking system on the train and simultaneously a luminous signal warning is given the engine-driver.

Due to ingenious padding of the levers and the transmitting mechanism to the engine no harmful strain on parts concerned is placed in consequence of the speed of the train. These mechanical stresses offer no problem with the Kofler signalling system. This was proved adequately in tests that were made on the Italian-Nord-Milan Railways on which the Kofler system operated faultlessly with the train speeding 90 miles an hour. Numerous other official records testifying to the dependability and

strength of the Kofler invention are available.

An outstanding feature of the Kofler Automatic Train Blocking System is that it may be installed at from a tenth to a twentieth of the cost of installation of the commonly-used electro-magnetic systems.

French Interests in China

(Continued from page 68)

and are regularly watched by about 3,000 patrons. Amateurs are well looked after, and can train under the supervision and advice of the professional players. The Parc des Sports also takes an interest in other sporting activities.

Although the French Concession forms an important part of French interests in Shanghai, as much by material capital as by the spiritual activities it represents, nevertheless it harbors but a fraction of the industries, commercial enterprises, and real estate properties owned by the French in Shanghai. These interests extend far into the International Settlement and, to a smaller degree, into Chinese territory.

The number of French business concerns in Shanghai exceeds 100, most of which have combined to form a French Chamber of Commerce in China, which is entrusted with the protection of their interests. The total amount of capital invested in these various concerns can be estimated at over 100,000,000 francs.

The activity of commercial enterprises covers a wide field ranging from import and export trade to banking activities, and includes shipping, insurance and real estate companies; and since the Great War, when China became an important market for foreign industrial products, several large firms in France opened branches in Shanghai.

The French Press in Shanghai is represented by the Havas News Agency, the *Journal de Shanghai*, a daily newspaper and the *Revue Nationale Chinoise*, a monthly magazine.

Industrial Interests

The major portion of French industrial activities in Shanghai are centered in the different branches of public utility grouped into one company, the "Compagnie Française de Tramways et d'Eclairage Electriques de Shanghai." Transport is by tramways, omnibuses, and trolley cars. The company at present possesses 98 tramcars, 50 omnibuses, and 28 trolley cars, which in 1937 carried nearly 50,000,000 passengers. Electricity is supplied to 40,000 users from two power stations with nine electric generators which

in 1937 produced 61,000,000 kilowatt-hours. The water supply comes from installations on both French and Chinese territories. The network includes 140 kilometers of piping which in 1937 distributed 19,000,000 cubic meters of water to 13,000 users.

As stated the French Catholic Missions in China were compelled to assure a source of income to carry out their humanitarian and religious work. Most of this income is derived from real estate. In Shanghai alone the value of mission-owned land was estimated at 58,000,000 taels in 1933; the sum being divided between land property and apartment houses. The real estate properties of companies and French citizens in Shanghai are estimated at 500,000,000f. at the present rate of exchange. This includes properties owned outright by French concerns or private individuals, mortgages on foreign-owned land by French companies, and finally interests in other foreign real estate agencies.

Speed Over the Flying Routes

(Continued from page 69)

it has been printed on such lightweight paper that, even with its envelope, it does not weigh more than half an ounce. This means that it is possible to send it by the non-surcharge air-mail scheme right through to a destination like Australia for a postage fee of only 1½d. In a few days, by air, such a price-list can be distributed over thousands of miles of Empire air-lines. And clients who receive it, picking out anything that takes their fancy, can rush through an order to London by air; the whole transaction being completed with a speed which would have seemed incredible not so very long ago.

One of the romances of Modern industry is to be found in the way in which organizations such as banks and business houses are adapting themselves to the speed and frequency of the great "all-up" Empire mail scheme. Instead of allowing letters to accumulate for any particular mail-day, they now keep up a regular stream of Empire correspondence, every day being regarded as an air-mail day; while special lightweight forms of stationery are used not only for ordinary correspondence but also invoices, bills-of-lading and statements of account of all kinds.

Notable Petter Power Installations in 1938

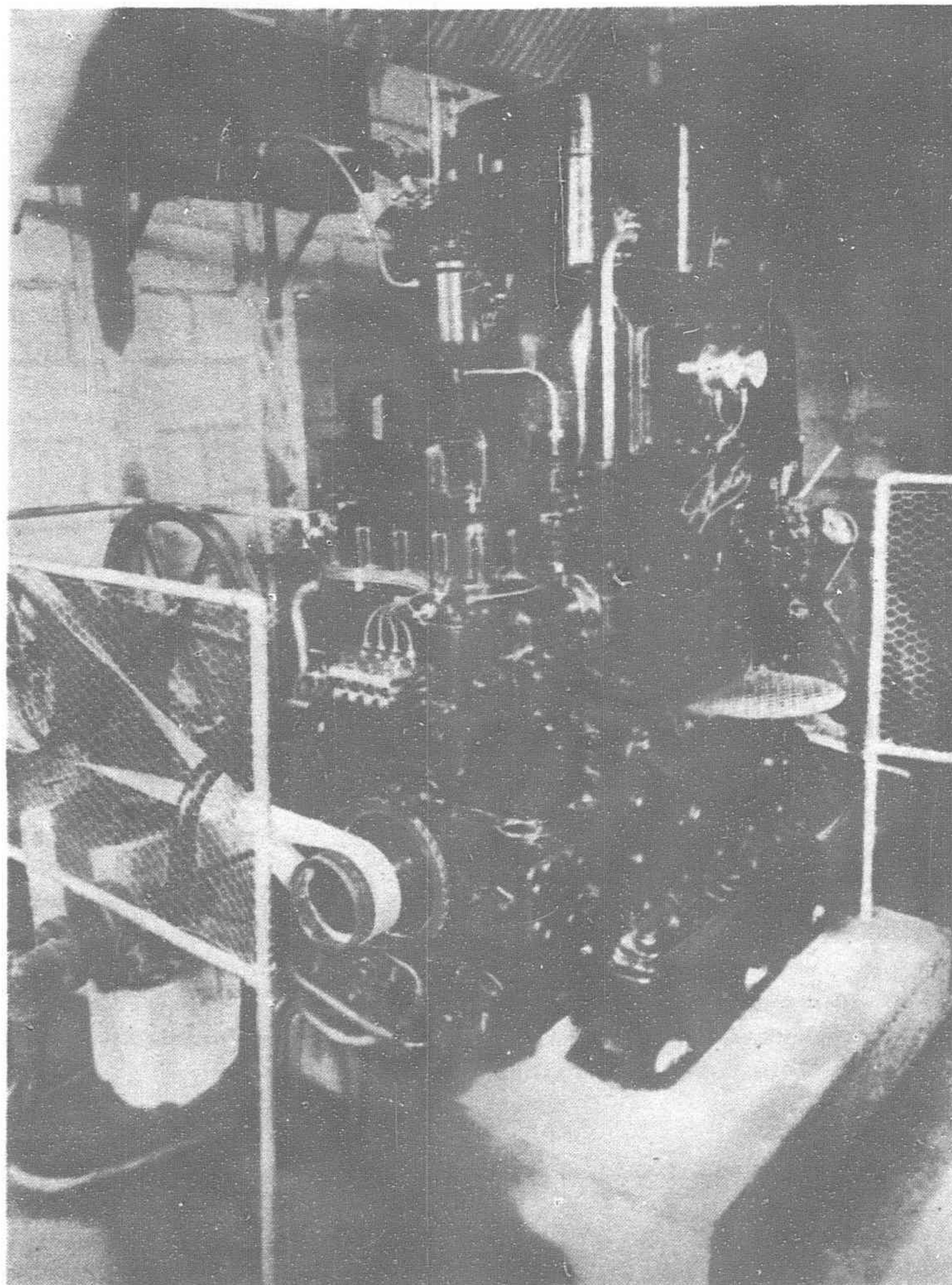
To meet an expanding market for stone chippings, Messrs. Gilsons, of Bath, have recently extended their quarrying activities near St. Austell in Cornwall, Cornish Blue Elvan being the stone worked. A minimum amount of handling of material in this quarry is the result of careful planning of the layout of the crushing and screening plant relative to the quarry face.

Messrs. Goodwin, Barsby & Co., Ltd., of Leicester, supplied the driven machinery, and the power plant, the latest production of Petters Ltd., who, by the way, have now transferred their plant from Yeovil to Loughborough. This is a 125 b.h.p. Superscavenger Diesel, and it drives by belt, crushing and screening plant, elevators, conveyors, granulators, air compressors and other machinery.

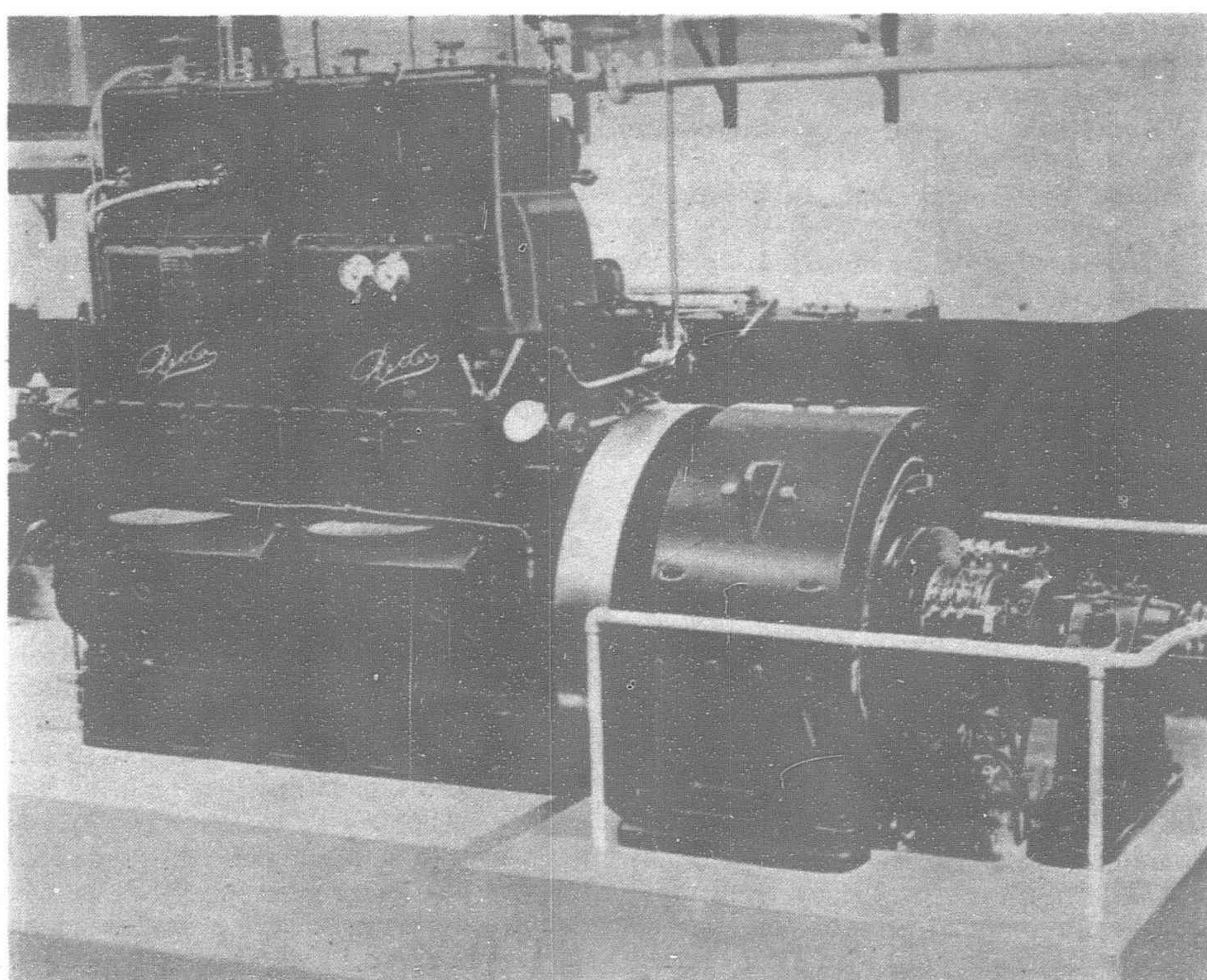
Quarrying operations place gruelling conditions upon all the plant used, and particularly upon the power unit, so that it will be understood Petters Ltd. derive justifiable gratification from the knowledge that Messrs. Gilsons, after nearly 40 years' experience of quarry plants and the testing of practically every kind of prime mover, have chosen once again a Petter unit in preference to the electrical grid supply, and that they have already three Petter units installed in their Somersetshire quarries, as well as two in Monmouthshire. Petter engines, in fact, represent 60 per cent of the horse-power of Diesel units operated by the Company.

Another noteworthy superscavenger installation of the year was a four-cylinder unit driving a British General Electric generator developing 120 kilowatts, this plant having been adopted by the Municipality of Kokstad in South Africa for the electrification of that town.

When the new set, as shown in the photograph, was started up in July, a high tribute was paid by the Chief Engineer to the performance of the two other Petter Diesel generating sets which, for several years, have



125 b.h.p. Petter twin-cylinder superscavenger engine, installed at Gilson's Molingy Quarry, Near St. Austell, Cornwall



250 b.h.p. Petter four cylinder SS engine DC to electric generator installed at Kokstad Municipality, South Africa

carried the load. The switchgear for the new set is by Siemens (South Africa), Ltd., and Stewart & Lloyds of Durban supplied the air compressor for starting.

Superscavenger engines have also been adopted by other Government Departments and Municipalities as well as by industrial concerns in many countries. Among these are the following: A unit of 187½ b.h.p. installed by the New Zealand Government for driving stone crushing plant; a 170 b.h.p. and a 90 b.h.p. by H.M. Office of Works at Chorley, for pumping; a 250 b.h.p. coupled to English Electric Co.'s generator by the Portsmouth and Sunderland Newspapers at Portsmouth; a 125 b.h.p. coupled to a Crompton Parkinson generator by the Fairey Aviation Co., Ltd. at Hamble near Southampton. Two of 187½ b.h.p. each by the Anglo-American Oil Co. for use by a Government Department; 125 b.h.p. for a quarry near Llandilo; 187½ b.h.p. coupled to a Harland Engineering alternator for electricity supply in Burra, South Australia; 250 b.h.p. for rope driving an alternator in an Engineering Works at Temperley; a 180 b.h.p. marine engine supplied per Messrs. Petters' agents The Borneo Co., Ltd., of London, to a destination unstated; a 125 b.h.p. engine installed in Bulawayo for gem mining, and a 312½ b.h.p. engine and alternator in a factory in Ipswich.

The subject of the above notes was described fully in *The Oil Engine* of July, 1938, after it had been demonstrated in Yeovil by the makers. Outstanding characteristics are the unique system of scavenging resulting in complete combustion with unusually clear exhaust—a power-weight ratio of the order of 45 lbs/b.h.p.—extremely conservative rating, and fuel and lubrication consumptions of .39 lbs/b.h.p. and .0033 pints/b.h.p./hour respectively.

Atomic Diesel engines have, in their own sphere, shared the popularity of the later Petter type during (Continued on page 80)

Rubber and Its Uses in Engineering*

By G. B. WALKER (Wilkinson Process Rubber Co., Ltd.)

IVING in Malaya, you are all familiar with raw rubber, and it is hardly necessary for me to describe it or its production. Practically the only use to which it is put without the special treatment known as vulcanization is that of sole crepe, and even this use does not absorb as much rubber as was formerly the case. Sole crepe, although a useful substance, displays the shortcomings of all raw rubber, and illustrates the need for vulcanization. It is fairly plastic and gradually spreads under pressure, it absorbs water, particularly sea water which makes it tacky, and oils which have the same effect, and if heated beyond a certain limit its plasticity is permanently increased so that if distorted in any way it fails to recover its former shape.

Vulcanization improves it in all these respects, reduces water and oil absorption and permanent set, and above all vastly increases :

- (1) the elastic limit to which it can be stretched and still recover;
- (2) the ultimate tensile strength and
- (3) the abrasive resistance.

Vulcanized rubber very frequently exceeds a breaking load of two tons per square inch and considering that at the moment of breaking it may well have stretched to ten times its original length, this is equivalent to twenty tons per square inch calculated on the cross-section at the time of breaking. Its tensile strength is therefore comparable to that of some metals.

The process of vulcanization in the most exact sense of the word is the combination of rubber with a vulcanizing reagent such as sulphur. Other possible reagents are selenium and dinitrobenzine but these are of little practical importance. The phenomenon is somewhat similar to the mixture of carbon with iron to form steel.

Vulcanization does not necessarily require the use of heat, but the reaction, in common with all chemical reactions, is accelerated by a rise in temperature. An important and comparatively recent development is the use of various organic chemicals known as accelerators. These used in comparatively small quantities very much reduce the time taken by the vulcanizing reaction. There are many accelerators, and they are all saddled with long names. The one I am most familiar with, for instance, is called piperidene-pentamethylene dithiocarbamate, though its friends call it P.P.D. for short. The choice between one accelerator and another depends on technical considerations which it will be unnecessary to touch on in this paper. In conjunction with these a so-called activator is necessary, zinc oxide being a typical example.

These chemicals are all that are necessary to produce vulcanized rubber of which there are strictly speaking only two varieties, soft rubber containing not more than three per cent of sulphur, and hard rubber or ebonite which contains half as much sulphur as rubber and which, though at one time of considerable importance, is now largely giving way to Bakelite products except where the thermoplastic properties of ebonite are of value.

Intermediate degrees of hardness are not arrived at by progressive increase in sulphur content between these two limits, but by adding to soft rubber various fillers which, without being necessary to vulcanization, produce the desired effect. The choice of these fillers and the quantity used varies with the properties required in the final product. Carbon black, zinc oxide and china clay are typical examples, and they are very often present to the extent of 50 per cent by weight in a vulcanized article, and even much more than this when cheapness is more important than quality, and in this case the rubber may be said to be acting merely as a binder.

The process of vulcanization is generally carried out roughly as follows :—

The rubber is reduced to a gummy consistency by milling it between rollers and the powdered chemicals are mixed in. This produces a dough which may be either applied to the carcase of a tyre, extruded through dies, or simply enclosed in moulds as may be required. Heat in some form is applied for a period varying from a few minutes to an hour or two and vulcanization takes place.

Bearing in mind that vulcanization is merely the combination of rubber with sulphur, there are obviously other possible methods of arriving at it. For instance, rubber can be vulcanized in latex form with or without heat, so that the dried latex compound produces a film of rubber which is already vulcanized as in the Vultex process, or the necessary chemicals having been added at the latex stage, the vulcanizing reaction can be deferred until after drying out as in the Wilkinson Process.

The number of compounds which can be produced is very large, ranging from a soft elastic band to ebonite and it would not be an exaggeration to say that a manufacturer of general rubber goods may handle as many as a hundred different mixes.

An interesting variety of soft rubber is rubber sponge. This may be made by the addition of chemicals similar in action to baking powder, but the Dunlopillo process is a latex process in which suitably compounded latex is whisked into a froth by special rapid stirrers, and the froth is poured into moulds in which it sets and is heat-vulcanized.

The properties of rubber which are of interest to the engineer are, resistance to abrasion and corrosion, electrical resistance, resilience or shock absorption, and ability to take up under pressure the inequalities of any surface with which it is in contact. Every engineering application of rubber takes advantage of one or more of these properties. They are produced and varied at will by the compounder by variation of the ingredients of the mix, and the most successful results can only be obtained if the conditions of service are correctly analysed so that these individual properties are present in the finished article in the right degree. For this reason it is always advisable for the engineer in ordering rubber to state in detail the use to which it is put, and the conditions of service. Often some point which may seem quite irrelevant may affect the nature of the compound supplied. Apart from the question of composition, the most suitable design of a rubber component can often be settled only by similar co-operation between the user and the manufacturer.

Now to pass on to a few specific branches of engineering in which rubber is used :—

In this country perhaps the most important branch from the point of view of this paper and certainly the one with which I am personally most familiar is mining. Until the advent of rubber to this field mining equipment subject to the abrasive action of sand or stone was protected by renewable steel plates or wood. Where waterborne sand is concerned it is found that a soft rubber will last at least five times as long as mild steel plate of the same thickness and often ten times as long. As the price of the rubber will only be about one and a half times or twice the price of the steel it replaces it is obvious that its use is of economic advantage. There are other advantages too ; rubber is about one-seventh the weight of steel and owing to the long life of the rubber liner the loss of time due to frequent replacement of steel plates is avoided. A well designed and well fitted liner is generally trouble-free for two years at least and, to borrow a phrase from a well-known advertisement, you can fit and forget.

Proper fitting of the liner is most important ; a rivet head left projecting in the bottom of a chute for instance will raise the liner and the raised portion will wear through comparatively quickly. Sand or stones allowed to get between the liner and the chute will have the same effect and the liner should therefore be carefully strapped to the chute at the sides and ends. Some manufacturers stick the rubber to the chute with rubber or bituminous solutions and one firm at least produces liner plates consisting of a layer of rubber bonded to thin steel. I have not actually seen the latter in use but I presume that they are attached in the same way as steel wearing plates and that some provision is made for joining the sections so as to provide a continuous rubber surface. Loose rubber liners can be made in one piece for attachment to any shape of chute unless the shape of the latter is such that the straps used to hold the liner must themselves be subject to abrasion.

If accurate drawings or preferably templates are available the liner can be sent to the mine ready to be strapped into position without further fitting but if straps cannot be used it is necessary to bond the liner to the steel and this will probably entail sending the steel part to the manufacturer.

Pipes and bends can also be lined with rubber. Again the liner can be bonded to the metal or merely held in position by the flanges. In the case of suction pipes the rubber *must* be bonded or it will draw away from the pipe and be torn out. In the case of bends the outer curve of the liner should be thickened up appreciably as the sand stream impinges directly on it in changing direction and wear is obviously greater. Rubber lined pipes should be lined up as accurately as possible so that the sand stream passes smoothly from one pipe to the next.

In a recent case where a detachable liner was torn out after a few weeks wear, it was found that preceding three lined pipes was an acute unlined cast iron bend. This bend wore rapidly and in such a way as to expose the flange by which the liner of the first of the three pipes was held in position. This being at right angles to the sand stream was rapidly attacked and the sand ultimately penetrated between the liner and the pipe causing the liner to bulge inwards and come away. In this case the manufacturer had been merely asked to supply the three straight pipe liners and if the whole lay-out had been disclosed to him he would have been in a position to recommend that the bend should also be lined which was subsequently done with, so far as I know, satisfactory results.

In the case of loose pipe liners which are held in position by the flanges the liners can be supplied alone to be fitted by the customer. The actual bore of the pipe should be stated if this differs from the nominal bore as is often the case. Cast iron bends should if possible be sent to the manufacturer for fitting as they generally differ from the drawing too much for accuracy to be otherwise obtained. As in the case of other mining equipment bonding the liner to the metal requires the manufacturer's supervision.

The use of lined pipes apart from longer life enables a lighter pipe to be used. If the pipes are made up from plate by welding or riveting care should be taken that the inside is free from projections. It should not be forgotten that the liner which is generally $\frac{1}{4}$ -in. or $\frac{3}{8}$ -in. thick reduces the bore of the pipe and it may be necessary on this account to use larger pipes.

Rubber lined centrifugal pumps show the same desirable wearing qualities. Generally the liners are bonded to the casing and impellor but it is possible in some cases to attach the liner by buried straps or rings. Opinions seem to vary as to whether a rubber lined pump consumes more power than an unlined one of the same capacity but generally even if there is some increase in consumption it is more than outweighed by the trouble-free service of the rubber-lined pump.

Stone chute liners in my opinion give varied results according to the conditions of service. In any case the conditions are much more severe than mere sand abrasion and the liner must therefore be a good deal heavier. The worst results occur when clay is passing over the chute. This does not slide as easily over the rubber as over steel bars and when it does slide causes wear, as a lump of clay often encloses stones which are dragged along the liner and abrade it more severely than if they were free to roll. In good conditions a rubber stone chute liner say $1\frac{1}{2}$ -in. thick at the thickest part will give a life of upwards of a year. Some advantage can be obtained by placing a sheet of rubber under the usual wearing bars in a stone chute. The rubber in this case is not subject to heavy wear but prevents the gradual erosion caused by sand trickling between the bars and attacking the shell, and rubber can be put to the same use in the drop-chute where its shock-absorbing properties also reduce the wear by allowing the bars to "give" somewhat under the impact of the stones.

Other items which are subject to abrasion and may be successfully replaced by rubber are jig spigot plugs and ore buckets.

Concentrating table covers can also be made in one piece complete with riffles and will wear almost indefinitely.

An interesting and fairly recent application is the use of rubber packing for ladder rollers and bottom tumblers. Here it is one of the apparent weaknesses of rubber which is made use of, that is its tendency to absorb grease and swell in so doing.

Generally these packings are made in square or rectangular sections and the gland should be so designed that the rubber completely fills the available space but no more. It should not be

forgotten that although rubber is easily distorted it is virtually incompressible and if the gland is designed so that the packing more than fills it with the object of exerting pressure, it will be found impossible to force the shaft of the ladder roller or tumbler through the available opening.

Close contact with the shaft is obtained by the rubber absorbing grease which causes it to swell. Once it has swelled enough to fill completely the available space the grease absorption ceases until the surface in contact with the moving shaft wears away and so provide space for further absorption. A continuously perfect seal is thus obtained and it has been found easily possible to retain grease under pressure in the bearing and to exclude grit. A ladder roller packing of this nature has been known to wear for two years without any attention beyond a daily turn of the grease plug and at the end of that time the ladder roller shaft and the bush were in perfect condition. In this application the nature of the rubber should be such that it will absorb grease without disintegrating and long life in the packing would seem to call for a design which reduces the area of rubber which is in contact with any moving surface to the minimum compatible with the retention of grease and the exclusion of grit.

The idea has been extended to the lubrication of bucket pins and no doubt if it is successful there will be a very considerable saving in power consumption as well as in replacements.

Other mining applications of rubber not so familiar in this country are tube mill liners, skip liners and conveyor belts.

Rubber surfaced conveyor belts are most successful in this as in other industries and a certain amount of success has been attained by tube mill liners but there are great difficulties in attaching a rubber liner to the shell of a large tube mill securely enough to prevent the liner being torn loose by the drag which occurs when the mill is operating.

Experiments are still proceeding and it is likely that this difficulty will be overcome and that the rubber tube mill liner will prove an economic success.

Rubber skip liners have proved very efficient ; besides reducing wear they increase the capacity of the skip as the resilience of the rubber prevents the ore caking at the bottom of the skip.

From mining engineering which is important locally I will go on to the industry which absorbs more rubber than any other in the world, that is motor engineering. Rubber tyres still absorb about 80 per cent of the world's production of rubber and their quality has improved enormously in the last twenty years, the mileage obtainable from a tyre having increased by four or five hundred per cent in that time.

When one considers that in the case of a 30 inch tyre every point on the wearing surface of that tyre comes into contact with the road and every section of the wall bends and straightens again over 600 times in every mile of travel one cannot fail to be impressed by the mileages obtained by modern tyres, which are the more remarkable when one considers the recent tendency towards non-skid road surfaces and faster speeds both of which mean more wear on tyres.

Centrifugal force as well is something to contend with at high speeds ; I believe the tyres on Sir Malcolm Campbell's record-breaking car were subject to such tremendous centrifugal force that the tread had to be reduced to something like a sixteenth of an inch, and I believe I read somewhere that at his top speed no air pressure in the tyres was really necessary to support the car.

Apart from tyres a further 40 lbs. of rubber may be used in a 15 h.p. car in various ways excluding rubber upholstery which is not yet in general use and which might account for another 15 lbs.

Rubber suspension systems are becoming more common but although rubber will provide the necessary cushioning effect it is difficult to combine with it the lateral rigidity of the normal steel leaf spring and some separate means of securing this rigidity must be found which naturally adds to designing difficulties and to expense.

The most common use of rubber in the suspension system of a car is the "Silentbloc" bush which is now fitted to a large number of cars instead of the usual spring shackle and which requires no lubrication.

This bush consists of two metal sleeves between which is a sleeve of rubber which is normally shorter and of larger diameter than the space it occupies. It is inserted under tension and in its effort to regain its normal shape exerts such pressure on the two metal sleeves that one of them can be turned through as much as

45° relative to the other without any slip taking place. All this movement takes place in the rubber itself and provided that movement is within this limit no wear takes place on the metal or rubber faces. As spring shackles these bushes give excellent service and I was disappointed to find that the manufacturers of my own car who used them on the last model I had now appear to have dropped them. One would think that they might find a place in mining in the mounting of concentrating tables and vibrating screens.

On the chassis and body of the car there are a number of pads of rubber designed to allow limited movement at points of attachment and to prevent squeaks; particularly in the case of the engine modern practice provides a very flexible mounting and prevents engine vibrations being transmitted to the frame. I believe that one car manufacturer held out against this for years, and may still do so, maintaining that a properly balanced engine needed no flexible mounting, and indeed one cannot help thinking that many manufacturers allow flexible mountings to conceal deficiencies in this respect. The old rigidly mounted engine provided a stiffening member for the frame and now that the engine is flexibly mounted stiffening has had to be provided elsewhere. These rubber engine mountings should be protected as far as possible from grease and oil and this is suitably done by enclosing them in light metal covers so designed as to provide the necessary protection without interfering with the freedom of the rubber to distort under load.

Pneumatic or hydraulic brake systems all employ rubber in tubes and pistons. Special fluids have to be employed to convey the pressure from foot to brake drum as ordinary mineral oils would cause the rubber to deteriorate.

In the body there are numerous small parts such as bearings, draught excluders, floor mats and door stops and various types of pneumatic upholstery of which the sponge rubber type is perhaps the best known. The electrical system depends almost entirely on rubber as an insulator.

Railway engineering finds many uses for rubber similar to motor engineering but on a heavier scale. A passenger coach making full use of rubber may employ a weight of over 600 lbs. 210 lbs. of this goes into the buffer and draw-bar assemblies, a similar amount into spring pads and body pads and 125 lbs. into the lighting system. The vacuum brakes and heating system require a number of small parts and though the total weight of rubber used in this way is not large the importance of this small amount to the safety and comfort of the passenger is obvious.

Passing to other forms of transport we have the "Cutless" type of bearing used on propeller shafts and while this name may be taken to indicate the qualities of the bearing it is in fact the name of the inventor. This bearing is water lubricated and is generally arranged with spiral grooves in such a way that the rotation of the shaft moves the water towards the outer end of the bearing, and with it washes away any grit that may have penetrated.

Connected with marine engineering is the problem of loading coal with the minimum of noise, dust and breakage. A rubber anti-breakage chute consisting of a large diameter hose fitted with internal baffles every few feet solves this problem by checking the fall of the coal without interfering with the speed of loading. The resistance of the baffles is adjusted from outside the chute according to the type of coal being handled.

In aeroplane engineering rubber contributes to the springs in the landing gear as well as to the monster tyres which often support far greater loads than the motor tyre. There are also deicing flaps fitted to the leading edge of the wings. When ice forms these flaps which are hollow are inflated by the pilot, thus breaking loose the ice.

In the case of flying boats a problem arose in connection with the fenders on the launches attending them. As the hull of the boat is very thin it is easily dented and the ordinary type of fender was much too unyielding for the purpose. A new type of fender which has the effect of surrounding the launch with a lightly inflated tyre is now being developed. This is made in sections about 18 inches long and enclosed in a continuous canvas cover to reduce friction.

Electrical engineering has already been touched on to some extent in dealing with other branches of engineering into which it enters but considered as a subject by itself it is obvious that it would not have got very far without rubber as an insulator either in the form of ebonite or in the soft and flexible type used for insulated wire. Ordinary vulcanized rubber is not however a perfect insulator as it generally contains impurities which are present in raw

rubber and which, being water-soluble, tend to reduce its resistance under damp conditions of service. Improvements are being made in this respect by purifying the raw rubber before vulcanization, generally at the latex stage, the latex being concentrated by centrifuging, diluted with water, centrifuged again and so on, repeating this process until the frequent addition and removal of water have washed away the impurities.

Chemical engineering makes use of the anti-corrosive properties of rubber in linings for tanks, pipes, valves and pumps and its anti-abrasive properties in lining pebble mills or ball mills used for producing very fine powders. A recent development is chlorinated rubber. This is quite different from ordinary vulcanized rubber, as it contains no sulphur or fillers and is a hard horny substance extremely resistant to corrosion, it is generally applied in paint form.

These protective coverings of rubber are often applied by an electro-plating process in which the rubber is deposited from a bath of compounded latex.

There are certain uses of rubber in engineering which cannot be classified under any one heading. Such general applications are machine mountings, belting and rubber hose. To be successful a machine mounting must be properly designed so as to insulate the machine entirely from its foundation. It is of little use to put a rubber pad under the foot of a heavy machine and then fasten that foot down with a bolt which is rigidly embedded in the concrete foundation. True, the rubber pad will give to a downward movement of the foot but on the return the foot will come into contact with the bolt head and transmit vibration through it. There must be a recoil pad on top of the foot to take this rebound, and to absorb horizontal vibrations there should also be a rubber bush surrounding the bolt. If an engine is very flexibly mounted some trouble may be experienced between it and subsidiary parts not so mounted such as exhaust pipes and fuel pipes but generally these can be overcome, as for instance in the automobile where flexible connections are often fitted.

In building or constructional engineering rubber is not much used except in the form of flooring. Singapore station is a good example of what can be done in this respect. As an adjunct to the erection of concrete buildings ribbed or rough surfaced rubber is now being used as a liner to the forms into which the concrete is poured. This is particularly so where it is desired to obtain a finished surface to which plaster will subsequently adhere as it will not do to the plain cement surface. By the use of rubber quite an attractive rough cast finish can also be obtained which only needs color washing as a final treatment.

In civil engineering we have rubber roads. These are comparatively expensive, but for certain purposes the expense is justified by final results. At anything but slump prices for the raw material it seems doubtful if they could be laid cheaply enough for general adoption and road engineers hesitate to lay down a rubber road based on a price of say 4d a pound when replacements some years later may have to be made with the price of rubber standing at two or three times this amount.

In conclusion I should like to say a few words about testing rubber. A good deal can be and has been done in the Laboratory but the actual service test still remains the one reliable means of finding out how a rubber article will behave in use. In a laboratory test designed to reproduce the effect of actual use, service conditions must be exaggerated if significant results are to be obtained within a reasonable time, and it is often impossible to analyse and isolate the various factors affecting wear, and reproduce them in the laboratory in the necessary exaggerated form.

Take for instance resistance to abrasion of the type that takes place in a sand chute. In actual service conditions the rubber will be worn away say one-eighth of an inch in a year. This is far too slow for a laboratory test and in order to speed up the test a sample may be rotated in dry sand. This dry abrasion produces a rise in surface temperature and thus a factor enters which was not present in the conditions which it is desired to reproduce, and it is difficult to correlate the results of the test with the results which may be obtained from the same rubber under service conditions.

Abrasion is a particularly difficult problem and there are at least ten different designs of abrasion testing machine sponsored by different rubber manufacturers or research organizations. No one of these machines can be relied on to produce the same figures as another with the same piece of rubber under test.

(Continued on page 80)

Port Swettenham Landing Ground

By R. E. PITTS, B.Sc. (Eng.), A.M.I.C.E. (*Journal of The Engineering Association of Malaya*)

IN 1927 Port Swettenham was visited by officers of the Air Ministry with a view to the establishment of permanent landing places for both aeroplanes and seaplanes and an area adjoining the Klang—Port Swettenham Road was provisionally selected as an aeroplane landing ground.

The area desired, one thousand yards square, was then under mangrove and arrangements were made to clear it to enable a more careful examination to be made. All the land in the neighborhood is low, much of it being subject to flooding at very high tides. The average level of the chosen ground was roughly 8.50 feet above Trig datum.

In November 1929 proposals for the preparation of the site were formulated by the Principal Works and Buildings Officer of the Royal Air Force Base in Singapore in conjunction with the Public Works Department. The scheme was to be carried out in four stages.

STAGE I.—To condition an L shaped portion of the site in order to provide two runways each one thousand yards long by three hundred yards wide.

STAGE II.—On the assumption that Stage I has proved successful, to complete the landing ground of one thousand yards by one thousand yards as a flat, subsoil drained and grassed area.

STAGE III.—On the assumption that Stage I has proved unsuccessful to "dome" the entire landing ground of one thousand yards by one thousand yards in order to prevent the area from becoming temporarily water logged.

STAGE IV.—On the assumption that, on the completion of Stage III, it is found necessary to provide a reservoir in which rain water from the perimeter ditches can be stored during such periods as the tidal gates cannot function.

The First Stage

A Contract was let in May 1930 for the carrying out of the first stage and the work was completed in April, 1931.

The whole area one thousand yards square was cleared and stumped. Bunds to enclose the ground were built from spoil excavated from the inside and outside perimeter ditches. These bunds are interesting in that they were provided with a central reinforced concrete slab three inches thick and bedded in a small concrete foundation also reinforced. The object of the central concrete core was two fold (a) to prevent leakage through the bund and (b) to prevent crabs boring through. There is no doubt that the second object has been definitely achieved. A crab hole is now rarely seen inside the perimeter ditches.

The inside perimeter ditches were excavated to a slope of one in two thousand and these discharge into the outfall ditch which leads direct to the Sungei Aur via the outfall culvert. The outfall culvert consists of two forty-eight inch diameter Hume pipes laid on a six inch reinforced concrete floor under which are two layers of close set six inch bakau rollers in the form of a raft.

The Hume pipes are provided with forty-eight inch automatic flap valves at the down-stream end and forty-eight inch screw down valves operated from the center of the low earth dam across the outfall ditch. It will be realized that this precaution is very necessary as the flooding of the landing ground due to the failure of a valve might have serious consequences.

Subsoil Drainage

When the clearing and grubbing up of the area within the perimeter ditches was sufficiently advanced work was commenced on the subsoiling. The whole of the piping consisted of 8-in. diameter unglazed earthenware pipes. Double 8-in. outlets were laid from a central circle to the center of each perimeter ditch. Also double 8-in. outlets were laid within the limits of the 300 yards wide strips to be conditioned at the S.W., N.W. and N.E. corners, and running into these outlets was laid a system of herring boned 8-in. pipes. It was understood at the time that this system was more or less experimental and that further drainage might be necessary.

The pipes were laid on a continuous bed of approved limestone chippings 2-in. in depth and graded from $\frac{3}{8}$ -in. to $\frac{3}{4}$ -in. sizes. The top half of each joint was covered with a layer of well puddled clay 1½-in. thick by 4-in. wide measured in the direction of the pipe line. Back filling was carried out with the original spoil excavated from the trenches.

The conditioning of the two legs one running N.E.—S.W. and the other N.W.—S.E. each 1,000 yards long by 300 yards wide was carried out by disk harrowing, rolling and sowing of grass seed.

The following levels may be of interest :—

Ground level of conditioned legs 8.00 to 9.00.

Level of top of bund 11.45.

Invert of outfall culvert—6.00.

These levels are referred to the Trig datum.

Following the completion of Stage I further subsoil drainage was carried out on the two conditioned strips and attention was paid to the treatment of bare patches where grass refused to grow. However, after a period of two years had elapsed the L shaped area was not fit to be used by all types of aircraft in all weathers and therefore it was considered that Stage I had failed.

The reason given for the failure was that, from the drying out point of view, the subsoil drains never operated to their full capacity as they had not a free discharge into the perimeter ditch. It is probable that subsoil pipes, when laid in such heavy clay, will never function quickly enough to dry out the surface of a landing ground in a country which experiences heavy and frequent falls of rain.

It was now suggested that a modification of Stage III should be carried out i.e. the "doming" of the L shaped area instead of the whole area. It was decided to dome to a slope of one in two hundred about seven hundred yards of the N.E.—S.W. runway starting from the S.W. end. First a catchwater ditch was constructed on the S.E. edge of the runway, the spoil being utilized for filling in the center of the dome. The balance of the fill was obtained by cutting at the edges of the runway thus producing a smooth dome from ditch to ditch, partly in cutting and partly on fill. This work was done during 1934 and the early part of 1935 with departmental labor. Furthermore an experimental area in the center of the dome sixty yards long by ten yards wide, was covered with two layers of laterite gravel each layer being consolidated separately and consisting of six inches of loose gravel. The thickness after consolidation was between eight and nine inches.

The gravelled area together with non-gravelled area was tested under the weight of a loaded lorry in July, 1935, after a period of fairly dry weather. The lorry used produced loads of approximately 1,100-lb. on each front wheel and 4,400 lb. on each rear wheel. The following results were obtained :—

(1) GRAVELLED AREA.—The lorry only ruffled the surface.

(2) DOMED EARTH SURFACE.—The lorry traversed this without trouble but the tracks were indented to a depth of about two inches. If the lorry had run a second time in the same tracks the crust would have been broken.

(3) FLAT ORIGINAL CONDITIONED SURFACE.—The lorry managed to pass over this area but it was touch and go whether the vehicle bogged or not.

It was noted that although the filling which constituted the domed area was of recent date there was a marked improvement over the original flat conditioned surface.

From the results of these tests it was decided that the only way to develop this landing ground at any reasonable cost was to provide two specially prepared runways and the work now in progress has this objective.

This work consists of :—

(1) Completion of the doming of the N.E.—S.W. leg.

(2) The doming of the N.E.—S.E. leg.

(3) The covering of an area 700 yards long by 120 yards wide of each leg with two six inch layers of laterite gravel and consolidating it.

(4) Covering the above area of the N.E.—S.W. leg with a four inch thickness of two and a half inch laterite stone in two layers and afterwards asphalt painting the surface in order to waterproof it.

Preliminary work was commenced early in March, 1936. Contracts were let for the supply to the site of laterite gravel and of two and a half inch laterite metal.

The necessary temporary buildings were erected and access to the site provided by temporary bridges over the perimeter ditches. At the same time work was started on the laying of the French drains and outlets to the perimeter ditches. The French drains were laid along the edge of the gravelled and metalled areas and consist of eight inch subsoil pipes laid at a depth between one foot nine and two feet six and covered with two and a half inch laterite metal up to the ground level. When the trenches were dug, owing to the muddiness of the bottom, it was found necessary to ram a thin layer of laterite gravel followed by a layer of $2\frac{1}{2}$ -in. laterite stone, on to which hot asphalt was poured and blinded with sand. This provided a fair foundation for the pipes and also prevented mud working up into the piping. The French drains were laid to a fall of one in two hundred and at every four hundred feet outlet pipes were laid to connect with the side ditches. These outlets consisted of nine inch spigot and socket spun concrete pipes jointed with cement mortar and laid to a fall of one in one hundred. The drainage system is designed to deal with a run-off of one inch per hour on the waterproofed area.

From experience gained with choked drains it has been decided to replace the $2\frac{1}{2}$ -in. laterite stone in the French drains with 4-in. to 6-in. hand packed laterite spawls. Some of this work has recently been carried out.

Earthwork doming was begun where the previous doming done in 1934 and 1935 ended. For the balance of the N.E.—S.W. leg the gradient was 1 in 125. That for the N.W.—S.E. leg is 1 in 100. The bigger slope was given on this leg as originally it was not proposed to waterproof the gravelled area. The doming is being carried out by Javanese Labor and on the whole the Javanese have been found very satisfactory. Each man has to cut and move into place by means of trucks and rails approximately $4\frac{1}{2}$ cubic yards of earth per day. The measurement is by truck, each truck having a capacity of $\frac{3}{4}$ of a cubic yard, but to account for voids each truck is actually reckoned to hold $\frac{1}{2}$ a cubic yard. Actually a "voids" test confirms this reckoning very closely. At the outset it was hoped to employ Malays on the doming but very few applied for the job.

Generally speaking the filling is deposited in two layers and consolidated by the following plant, a caterpillar tractor, an agricultural tractor pulling a water ballast roller, a four ton motor roller or a six ton steam roller. It all depends on the weather. In wet weather it is impossible to use even a four ton tandem roller but under these circumstances the caterpillar tractor pounds together the soft lumps of clay and if the agricultural tractor and roller follow up behind quite good consolidation is obtained.

During the months of July, August and September it was so dry that the caterpillar tractor was of little use and most of the consolidation was done in three stages:—

- (1) Agricultural tractor dragging a 2 ton water ballast roller.
- (2) A four ton motor roller with wide wheels.
- (3) A six ton steam roller.

This gives almost perfect consolidation when the fill rarely exceeds 2-ft. 6-in. in depth. A good deal of care is taken to get the consolidated fill reasonably correct to grade and a Technical Assistant is employed giving levels and checking consolidated fill. This has been found worth while for when graveling is carried out it is easy to get a smooth grade and no gravel is wasted filling in depressions.

A description of the graveling is now given. This is really the crux of the work and upon it the success of the whole scheme depends. The Contractor started work at the end of March. Each lorry was measured and marks were painted on the inside showing the correct measurement. The Contractor provided printed duplicate books which are kept by a checker. As each lorry arrives at the Aerodrome the load is inspected and one half of the duplicate filled in with the lorry number and quantity of gravel. This is handed to the driver. A separate book is kept for each lorry so that the checker shall not get muddled when lorries of different capacities are working. A second check of the total quantity per day is kept by another man stationed where the gravel is off-loaded.

The Contractor has employed a fleet of 14 Ford V 8 lorries which have proved to be very serviceable and after initial difficulties he has supplied an average of 300 cubic yards per day.

When gravel was first delivered it was difficult to get it into place for after a lot of rain the earth formation was soft. The lorries had to run over the formation with the result that many were bogged and the earthwork crust was frequently broken. This caused a great deal of trouble later on as will be presently described.

The gravel is consolidated in two layers each approximately 6-in. thick in the loose. It was found that once a small area of first layer had been laid and consolidated work was able to proceed with greater ease, as the lorries did not need to run on the earth formation. The first layer was pushed ahead to nearly 400 feet before the second layer was started and since then it has been customary to reserve the laying of the second layer for wet weather so as to avoid damage to the earth formation.

On starting to put down the second layer trouble was immediately experienced. In many places it was found that the gravel would not consolidate and form a crust. When these places were opened up they disclosed the fact that the clay crust had broken and been squeezed up to within an inch or two of the surface of the gravel. This was due to the cutting up of the earth formation by lorries as already described. To remedy the trouble it was necessary to dig up the bad patches to a depth of 9-in. to 12-in. and refill with selected gravel in 3-in. layers each layer being well rammed.

Two other interesting points were observed in connection with graveling. The first was that gravel with a low clay content was not very satisfactory as it would not bind together and form a good crust under the roller. The second that in very dry weather the gravel needed a light watering to lubricate the clay content and produce the necessary crust.

Before work was started great stress was laid on the fact that it would be possible to spread and roll gravel only in very dry weather. This has been proved incorrect and provided the earth formation is not completely sodden work can go on a few hours after heavy rain. The great secret is to spread and consolidate all gravel as soon as it arrives on the job. If heavy rain falls and gravel has been left in piles or spread and not consolidated, it becomes so sodden that it cannot be rolled until after two or three days of dry weather.

For the consolidation of the gravel a four ton roller with wide wheels (preferably a tandem roller) has been found most useful especially for the initial rolling. After being well compacted with a four ton roller, a six ton and sometimes an eight ton steam roller has been used.

Metalling and Asphalt

No attempt was made to commence this work until the weather improved which was early in June. From then until the middle of September the weather was very dry and good progress was made, almost half the metalling being completed.

The laterite stone was quarried at Sungei Nipah Quarry which is on the Damansara Road about $2\frac{1}{2}$ miles from Batu Tiga, i.e. about seventeen miles from the Aerodrome. The quarry is one of the best and most extensive laterite quarries in the country. Stone is present in large quantities and almost all of it is black in color and quite hard.

Work was started on the S.W. end of the Aerodrome and once again this area gave trouble. For the first hundred feet large areas of metalling refused to consolidate owing to "squeezing." "Squeezing" was due to poor foundations owing to the gravel having been laid, in exceedingly wet weather, on a formation cut up by lorry wheels. To cure it the bad areas were excavated to a depth of about 1-ft. 6-in. Then about 1-ft. of coarse sand was filled into the hole, 6-in. laterite block metal laid and the small metal put back. No further trouble has been experienced in this area nor has there been any more trouble of a similar nature elsewhere.

The stone is spread in two layers and is consolidated by a six or eight ton roller. The metalling is carried out in 21-ft. wide strips from side drain to side drain. When fully consolidated the metalling is blinded with coarse river sand and again rolled.

It has been found unwise to leave the metalling too long before asphalting, for rain is liable to penetrate through the metalling to the gravel, which then becomes muddy and takes a long time to dry out.

The asphalt painting is carried out in the usual way, the surface to be treated being brushed clean with wire and bass brooms.

These sweepings consisting of sand and very small pieces of laterite make excellent blinding material for the metalling ahead. When the surface is quite clean it is usually left for an hour or two to make sure that it is perfectly dry. Asphalt is then poured over the surface from cans with spouts which give a good "spread" to the asphalt. With these good cans brooms or squeegees are rarely needed as it is not desired to produce as thin a layer of asphalt as possible but to make the surface waterproof. It was expected that half a gallon of asphalt per square yard would produce this effect and actually to date average "cover" has been about 0.43 gallons per square yard. The asphalt is blinded with coarse river sand and well rolled with a four ton roller.

Originally it was intended to leave the N.W.—S.E. leg with a gravelled surface but it is now felt that if this is done maintenance will be expensive. Recently therefore some experiments have been carried out with soil stabilization and surface painting of the gravel, the object being to find a material which will bind the gravel and produce a reasonably waterproof surface. It is too early yet to say whether any of these experiments are likely to prove successful.

Routine maintenance of the landing ground is carried out and consists of keeping down the grass on the edges of the prepared runways, cleaning the perimeter ditches and of maintaining the bunds. Included in this routine maintenance is the destruction of crabs.

The method of preventing crabs from boring through the bunds has already been described but it has been necessary also to get rid of the existing inhabitants of the enclosed area. For the past three years a man has been engaged searching for holes and destroying the crabs. The destruction has been carried out by means of a solution of Tuba root and lime. When a fresh hole is discovered a cigarette tin full of this liquid is poured in and the hole plugged with clay. The results are remarkable. The number of fresh crab holes diminishes monthly and very few are now seen. The preparation of the solution of Tuba root and lime is rather rough and ready but not the less effective. Twenty-five to thirty gallons of water are put into an old barrel to which is added two buckets full of quick lime. Thirty catties of Tuba root are then added and it is left for a week. At the end of this time the Tuba root is thoroughly pounded and the mixture well stirred and it is then ready for use.

In conclusion the author wishes to acknowledge his indebtedness to the Selangor State Government, the Adviser, Public Works and the Air Ministry for permission to read this paper and for access to official documents without which it could never have been written.

equally reliable results he can only obtain them either by erecting and running his own dredge or by obtaining the co-operation of his customers.

There are other types of rubber goods to which the same conditions must apply and in such cases if the purchaser feels inclined to resent enquiries as to performance and so on I think he should make allowances for the fact that the information asked for can be obtained by no other means except such as would add enormously to the price of the rubber used. At any rate he may be assured that any help of this nature he can give is very much appreciated by the manufacturer and that if he thus casts his bread upon the waters it will certainly return to him in due season a tougher and more lasting product.

New "Deep Foundation" Process Perfected by Japanese Engineers

(Continued from page 70)

cases construction of a large chimney has been considered impossible, but now with the application of this process, it enables the construction of a perfectly solid chimney at a space which is practically equal to the dimension of the chimney itself. The hollow part of the chimney underground can be utilized as a well or a water reservoir.

From the above it will be clear that the application of this process is very extensive. To cite such instances one by one is an inexhaustive source of interest. However, one of the instances worthy of particular mention here is that of exploiting natural resources. By the "Shinso" process of shaft excavation, a shaft to a depth of several hundred meters can be bored quite easily and speedily, and this incidentally opens a new field of application in the mining of varying kinds of ore in the state of lump or seam, and here again the patented "Shinso" process of frame mining can be adopted, and will obviate the waste of ore to an extent of 60 per cent which has been inevitable by the former processes in this line.

Sugar Plants in Manchoukuo

The construction of two new sugar factories in North Manchoukuo within the next year that will double sugar production in Manchoukuo is the aim of Mr. Lew Zikman, vice-president of the North Manchurian Sugar Industrial Company, who returned to Harbin in January after a trip in the United States to purchase machinery for the new plants.

The real significance of the development, Manchoukuo's pioneer sugar manufacturer (he has been in the sugar business in Manchoukuo for 23 years), said lies in the effect on agriculture. Sugar beets make possible crop rotation, and the pulp left after the sugar is taken out provides much-needed fodder for cattle. Being a domestic product and not subject to great exchange fluctuation, sugar will serve as a budget stabilizer for the Manchoukuo farmer, harried at present by his total dependence on the exported soya bean, which fluctuates so greatly in value that the farmer is well off one year and a pauper the next.

Mr. Zikman's company, the capitalization of which is 52 per cent Japanese and 48 per cent Polish, at present turns out 70 tons of sugar a day, or slightly less than half the total production of Manchoukuo and cultivates some 6,500 hectares of sugar-beet land. It utilizes some 35,000 Chinese farmers on the land and 1,000 workers (700 Chinese, 250 European and 50 Japanese) in the factory. The new production figure of 250 tons of sugar a day will more than triple the company's present output and necessitate the bringing of 15,000 more hectares of land under sugar-beet cultivation. This offers no difficulty, Mr. Zikman pointed out, as there are sufficient farmers and land already farmed available to take care of the beet supply.

Farmers will alternate crops on a four-year basis. There will be soya beans the first year, beets the second and wheat the third. The fourth year, the land will rest.

Notable Petter Power Installations in 1938

(Continued from page 74)

1938, and installations include: for industrial drive a 270 b.h.p. engine at Torr quarry near Totnes, Devon; a 112 b.h.p. in a gravel pit near Newbury; a 160 b.h.p. rope driving in a brick making Works; one of similar horse-power driving stone quarry machinery at Ham Hill in Somerset; a 224 b.h.p. coupled to a Canadian Westinghouse generator for British Columbia; one of 160 b.h.p. for air compressing in the Sudan, and a repeat order for a 144 b.h.p. engine for mining in Lima, Peru. For a purpose unstated a 108 b.h.p. was sent to South Africa. For marine service two 195 b.h.p. engines form a twin-screw installation in the M.V. *Cecile Mapleson*; while single units of similar size are fitted one in the M.V. *Falie*, the other in a vessel in New Guinea, name unknown. Two similar propelling units will be used in an Oil Tanker being built in Taikoo dockyard, a 50 b.h.p. engine and cargo and general service pump being used as auxiliary for the same vessel.

Rubber and Its Uses in Engineering

(Continued from page 77)

Therefore all rubber manufacturers must rely to some extent on service tests; a tyre manufacturer can test his tyres to destruction under actual road conditions fairly easily, but if a manufacturer of the various linings used on dredges wishes for

Japan Supplies Britain with Most of Her Fish Foods*

THE British fishing fleets are passing through bad times. The market prices of fish are low and many boats are out of service. Another source of trouble is that many boat owners find difficulty in purchasing new and up-to-date craft. A recent Government scheme encompasses the construction of approximately 250 motor boats at an average cost of £3,000 spread over a period of five years. These figures may vary according to circumstances. This scheme is not one for adding ships to the existing herring fleet, as the future number of boats will not exceed the existing number. Before a grant is given for a new boat an old one will have to be discarded.

Meanwhile in view of the bad times through which the British fishing industry is passing it is interesting and illuminating to give a few details about the manner in which other nations send fish into Britain—surely a case of “carrying coals to Newcastle.” Most people will be astonished to learn that Japan supplies most of the British fish foods. In an interesting article recently published in *Fishing News* the author revealed that in 1937 Japan was the largest individual importer into Britain, while Canada was left far behind.

Last year the value of fresh fish landed by British fishing vessels direct from the fishing grounds was £11,933,000, and the quantity of all kinds (fresh or preserved) imported into the United Kingdom in 1937 was valued at £10,378,000—an increase of two per cent in value compared with the year preceding. If we deduct the quantity re-exported there remained for consumption in Great Britain foreign fish to the value of £9,794,000, an increase of ten per cent compared with 1936.

Canned salmon is responsible for close upon half the total and amounts to no less than £4,532,000 and a remarkable fact is that Japan secures easily the lion's share of purchases. The total value of imports from Japan last year amounted to £1,990,253 compared with £1,530,000 in 1936.

In view of the progress made in the Canadian canned salmon industry it is peculiar that the Dominion stands lowest in the list of canned salmon importers. Although in 1937 she increased her figures slightly over those of the previous year, her figures of exports to Britain stand at less than half of Japan and a considerable way behind both Soviet Russia and the U.S.A. The following figures clearly reveal the position:—

	Cwts.	Value in £
Canada	175,268	786,417
Japan	454,456	1,602,808
Soviet Russia	293,810	1,074,686
U.S.A.	255,041	1,065,974

In 1937 Russia increased her canned salmon exports to Great Britain by some £60,000, and added £35,000 to her crab consignments which reached a total of over £250,000. In return Britain exported to Russia 14,700 cwts. of cured herrings valued at £6,645, compared with 129,194 cwts., valued at £64,675 in 1936. The Herring Board should find some means of equalizing up matters, as the discrepancy is far too wide to be a source of satisfaction to British fishermen.

Norway, too, enjoyed a good measure of success in the British market. From that country we imported fish of all kinds (fresh,

frozen, cured and canned) amounting to £1,706,319. Of this £220,000 represents herrings and £263,000 sprats—a most curious and unnecessary state of affairs when one considers the vast amount of those fish abounding in the waters around the British Isles. One often reads of huge herring hauls made by British fishing vessels, and why we should have to import any of these fish from Norway is a matter which passes our comprehension. Here again is a job of work for the Herring Board.

It does seem remarkable that with the increased proficiency in the canning of British fruit and vegetables we should continue to import so much canned foreign fish, much of it of inferior quality and taste, its only merit being that of cheapness. It would be most interesting, also, to have reliable reports concerning the nutritive value of canned foreign fish.

The weights and values of canned fish imported into England during 1937 is an indication of the lucrative value of this trade to many countries:—

	Cwts.	Value in £
Salmon	1,178,847	4,532,287
Herrings	14,561	121,738
Pilchards	71,015	116,575
Sprats	43,252	265,172
Sardines	101,026	441,396
Lobsters	20,428	287,891
Crabs	80,695	650,039
Other sorts	107,033	490,431
Total	1,616,857	6,905,529

Reviewing the above list in detail one notes that herrings, sprats, lobsters and crabs account for a considerable proportion of the total imports—and yet all these articles of food can be easily obtained around the shores of Britain. Tins containing “other sorts” of fish come into this country in quantities. One is justified in asking of what these cans of “other sorts of fish” contain and the query arises as to whether some of them may not be of an injurious nature. The British Customs authorities are, of course, entitled to inspect anything of which they suspect. But it would be far more comforting if we could be assured that the canned products of all nations were subjected to the rigorous inspection prevailing in Australia, Canada and South Africa; the canned products of these Dominions are supervised by Government inspectors and customers are assured of the quality and purity of their contents. No such guarantee can be given in the case of foreign canned food products.

In contradistinction to the heavy imports of foreign fish into Britain our exports of all kinds of fish food reach the total of £3,749,751. The scales are so heavily loaded in favor of foreign importers that it is clearly time for the appropriate Government department to level out matters and give much needed help to British fishermen. Meanwhile British housewives can help by their purchases, when possible, of British fish, or Dominion canned fish.

* *The Imperial Review.*

Japanese Envoys to Confer

A conference of Japanese ambassadors in Europe will be held in Berlin early in the year, it is learned.

The Japanese envoys to London, Moscow, Berlin and Rome have been shifted recently, and with the prospective changes of the ambassadors to France and Belgium, the shifting of all Japanese ambassadors to Europe will be completed.

Taking advantage of the occasion, it is learned that Foreign Minister Hachiro Arita will instruct the envoys to Europe to hold a conference in Berlin early in the year in order to establish connections for the executions of the diplomatic policy.

Toshio Shiratori, newly appointed ambassador to Rome, who is now on his way to his post, will explain in detail the highest policy of the government at the ambassadorial conference.

While the ambassadorial conferences have been held once or twice yearly in London or Paris hitherto, great significance is attached to the forthcoming conference, which is to be held following the establishment of a new policy regarding the China Emergency and the policy of adjusting the relations with England, America, Soviet Russia, France, Germany and Italy.

Engineering Notes

AVIATION

SOUTH SEAS SERVICE :—Regular air service between Tokyo and Palau, in the Japanese Mandated South Seas Islands, will open on April 1, it was announced here as Cabinet approval was given to a Y1,730,000 annual subsidy for the line. Bonin Islands and Saipan will be on the itinerary. The flight will require nine hours.

TRAINING PROGRAM :—Financed by a Y9,901,000 appropriation approved by the Japanese Cabinet to-day, a mass training program for aeroplane pilots and mechanics will get under way in April. The project calls for the education of 50 first-class and 700 second-class pilots, 80 mechanics and 500 other civilian fliers in 10 training centers established in various parts of the country.

AERIAL RESEARCH :—Construction of the Central Aeronautical Research Institute will be started next April in Japan on a five-year plan which provides for an expenditure of Y50,000,000. An allocation of Y3,630,000 to the Ministry of Communications for the first year of construction was approved by the Cabinet. The Ministry of Communications will call a special committee meeting to map detailed plans to build the institute.

TOKYO AIRPORT :—Tokyo was assured of a new municipal airport when the Finance Ministry approved the granting of a subsidy of Y3,000,000 by the Ministry of Communications, included in the department's budgetary estimates for the next fiscal year. Work on the project is to be completed by 1941 at an estimated cost of Y12,000,000. It will be larger than the Haneda International Aerodrome. An additional Y2,000,000 was also approved for the expansion of the Fukuoka airport.

CHUNGKING-KWEILIN ROUTE :—The Eurasia Corporation will inaugurate a new route between Chungking and Kweilin, the capital of Kwangsi, thus solving the communication difficulties between Szechuen and Kwangsi. Hitherto travellers between Szechuen, Kwangsi and Hunan had to travel by car, which proved slow and expensive. With the inauguration of the new air line, travellers will fly to Kweilin and then proceed to Hunan via the newly-opened Kweilin-Hengyang Railway.

AIRPORT AT SHANGHAI :—A huge Japanese airfield is under construction near Shanghai, about 18 miles west of the North Station at Shanghai, according to an observer. Bricks and building material are being daily transported to the airfield by a fleet of some 200 trucks. The bricks are being taken from the ruins in the areas north of the creek, it is said. Some 30,000 Chinese laborers are employed by the Japanese on the airfield at 20 cents a day each. The entire expanse of the field is being dug several feet deep and being filled with bricks, the observer added. On the surface of the bricks will be a layer of sand and loam, it was stated.

MINING

IT IS REPORTED :—That the Yangchiachangtze mine, now being worked by the Manchuria Lead Co., has an estimated deposit of 2,100,000 metric tons and that the ore contains 12 per cent of lead and from 40 to 50 per cent of zinc. The deposit in the Tsingchentze mine, which the Anfeng Mining Co. is exploiting, is estimated at 1,600,000 metric tons. The mines can each turn out 3,000 tons of ore monthly.

KAILAN COMPANY REPORT :—A profit of £215,212 is reported by the Chinese Engineering and Mining Company for the year ended June 30 last. After allowing for taxation and adding the sum brought in there was £259,743 available, of which £147,000 has been distributed as a dividend, equal to 7½ per cent, free of tax, leaving £112,743 to be carried forward. The sales of coal by the Kailan Mining Administration in the year totalled 4,213,000 metric tons.

COPPER DISCOVERY :—A prospecting party organized by the Manchoukuo Ministry of Economics claims to have discovered "the richest copper vein in the Orient," both in potential capacity and quality of ore, according to a special dispatch to the Tokyo *Nichi Nichi*. The vein, described as approximately 40-ft. wide and eight miles long, was discovered 12 miles North-east of Fengcheng in the Eastern Manchoukuo Frontier district. The copper content of the ore is reportedly as high as 6 to 24 per cent.

NEW GOLD FINDS :—In 1938 several gold occurrences were discovered in various districts of the U.S.S.R., according to a Tass Agency message from Moscow. Gold-containing quartz seams were found in Kazakhstan, 150 kilometers from Akmolinsk and the extraction of gold has already been started there. Rich baryte deposits, containing gold, were also discovered in the Pavlodar and Karaganda district of Kazakhstan and a number of new gold veins were found in Kirghizia, in the Altai, in Yakutia, in the Chkalov (former Orenburg) region, and auriferous sands—in the bed of the river Khram in Transcaucasia, in Baskiria and in the Kirov district.

NICKEL IN THE URALS :—It is reported in a recent issue of *Industria* that the Ufalei Geological Prospecting Bureau has carried out extensive prospecting for new deposits of nickel ore on areas adjoining existing mines. On the Tyulenevsk and Krestovsk deposits, new reserves of ore were found lying comparatively near the surface. Both these deposits appear to be connected. It has been ascertained that the ore strata of the deposits in the south and north-western part of Cheremshansk stretch much farther than was originally supposed. The ore here occurs at no great depth and has a high content of nickel. These newly discovered strata of nickel ore ensure a four years supply for the local nickel works. In the Rezhevsk region of the Sverdlovsk Province two new areas were found with considerable reserves of brown hematite containing nickel and cobalt. The Kaparulinsk deposit is estimated to be sufficient to supply the Rezhevsk Nickel Works for three years.—*Mining Journal*.

COMMUNICATIONS

SHIPPING SERVICE :—A fleet of merchant vessels will be put in service on a direct route between Japan, Manchoukuo and Italy by the Nippon Yusen Kaisha this year.

HANKOW TO SINYANG :—Resumption of regular train service on the Peking-Hankow Railway between Hankow and Sinyang, a distance of 200 kilometers, was reported in Hankow. The service, however, is interrupted at the Wusheng Pass between Hupeh and Honan Provinces, where a section of the track was destroyed by Chinese troops. Repairs on this section have not been completed.

DOCKYARDS PLANNED :—The Japanese are planning to construct dockyards at Nanking and Hankow for the repair of their naval vessels, the number of which has increased with their penetration up the Yangtze into Hupeh province, states the Shanghai correspondent of the *Wah Kiu Yat Po*, Chinese daily. A campaign by advertisement to enlist laborers for these works has been in progress in Shanghai.

TSINPU LINE TO OPEN :—Through traffic on the Tientsin-Pukow railway was expected to be resumed in December, according to information from railway circles in North China. It is stated that at present trains on the Tsingpu railway reach as far south as Pengpu and that only the section between that city and Pukow is now under repair. The whole line is expected to be open to traffic shortly. It is further stated that the Peiping-Nanking-Shanghai through express will probably be resumed some time in January, 1939.

YUNNAN-BURMA ROAD :—The much talked of Yunnan-Burma highway has been completed. Although not yet perfect, a fairly large number of trucks have arrived from Burma by this new road. Both heavy and light trucks are now a common sight on this, Yunnan's most famous road. Meanwhile, work on the Yunnan-Burma railway is progressing. The surveying of the line from Kunming has now reached Yun-nan-i, a small bus-stop a few miles east of Talifu. At this point the new railway leaves the highway and turns south-west.

SHIPPING

JAPANESE SHIPBUILDING :—Japanese shipping companies have eighty-four ships, totalling 521,740 tons, at present under construction. It is planned to launch all these ships during the current year. It is also proposed to launch 114,190 tons of shipping in 1940, and five ships of 72,500 tons in 1941.

NEW MOTOR-SHIP :—The port of Shanghai, in the spring, will see the latest addition to the East Asiatic Company's fleet of motor vessels, the 12,000-ton freight and passenger carrier *Kina*. The vessel, which was launched at Nakskov Shipyards, Denmark, on November 5, by Her Majesty Queen Alexandrine, will be placed on the Europe-Far Eastern route. The *Kina* is a diesel motor-ship like all other vessels of the East Asiatic Co., which in 1911 introduced in its service the first ocean-going motor-ship ever built, the m.v. *Selandia*.

UNUSUAL SALVAGE JOB :—Work to salvage the sunken Japanese warship *Otowa* off Daiwo Cape, Namiki-machi, Shima-gun, Miye Prefecture, will be started soon by scores of workmen under Tomizo Matsui. The work will be watched with keen interest in view of the fact that its success will mean the triumph of Japanese engineering circles and will contribute toward the alleviation of the iron famine situation in Japan. The warship in question was sunk 21 years ago off the coast of Miye Prefecture and many years ago Tasuke Tanaka, President of the Tanaka Wheel Manufacturing company purchased the warship from the Navy Office. The warship was recently sold by Mr. Tanaka to Mr. Matsui.